COSMOSIL

High Performance Liquid Chromatography

CORPORATE PROFILE

Nacalai Tesque dates back to 1846 when the company's founder Mansuke Nakarai opened Nakarai Mansuke Shoten, Ltd., an apothecary selling traditional Japanese and Chinese medicines. In 1958, this company's reagent department became an independent company, Nakarai Chemicals, Ltd.

The company has since dedicated itself to expanding its corporate base and has strived to be an enterprise that our customers always rely on, while taking pride in its contribution to scientific and industrial development.

Making the most of this 30-year history and as a step toward the future, Nakarai Chemicals changed its corporate name to Nacalai Tesque, Inc. in 1988. At Nacalai Tesque, we have fostered a corporate commitment to the pursuit of reliable quality and the creation of products of real value, while serving as a vital link between humanity and science. Centering around research chemicals, the fields of our activities include fine chemicals, diagnostics and related laboratory equipment and supplies.

The pace of scientific and technological progress in every industrial field is rapidly accelerating, and all business partners and affiliates are required to provide even more diversified and advanced expertise.

It is our corporate policy to strive for our lofty ideals for excellence while respecting our long history and tradition. We consider it our mission to maintain close contact with our customers by offering reliable quality in all our products, information and services, and by making full use of the knowledge and experience of our staff.

The 30th Anniversary of COSMOSIL HPLC Column

In 2010, Nacalai Tesque reached another important milestone in the company's history with the 30th anniversary of COSMOSIL brand HPLC column. For the past 30 years, Nacalai Tesque has provided innovative and reliable chromatography products to the analytical industry. Our goal has not changed since the first COSMOSIL HPLC column was developed in 1980; it is to focus on customer needs and make customer's separations as successful as possible by offering the highest level of products and technical support. Keeping this goal in mind, we look forward to serving the industry for the next 30 years and beyond.

COSMOSIL

CONTENTS

General information

General ordering information

When placing an order with us or making an enquiry, please contact our International Business Development Group or your local distributor. Please clearly identify the product in question when submitting your enquiry.
The speed of innovation is accelerating. We always have brand new or improved columns not listed here. There are also many other products Nacalai Tesque can supply. Therefore we urge you to make enquiries.

Product description and availability

Please note that the product specifications are subjected to changes and the manufacturing of some product may be stopped. Please consult the table on page 11 for cross-reference information on old products and their newer and better equivalents.

Column identification

At the end of each section, the COSMOSIL and COSMOGEL packed columns are listed in a way that the particle size, stationary phase, column size of the packing material can be easily determined.

38019-81 COSMOSIL 5 C_{18}-MS-II 4.6 mm I.D. x 150 mm
(1) (2) (3) (4) (5)

When placing an order, please clearly indicate the product number (1), product name (2), particle size (3), type of stationary phase (4) and column size (5).

Warranty claims

The manufacturer will replace defective columns if notified within 2 weeks of receipt of the product by the customer under the following conditions:

1) Column abnormalities are due to accidents in shipping or rough handling.
2) The number of effective plates of the column is considerably lower than the minimum guaranteed theoretical plate number documented in the inspection report that accompanies each column.

Please contact the International Business Development Section of Nacalai Tesque or your local distributor for additional information.

Terms and conditions of sale

Terms are subject to conditions set forth by the authorized Nacalai Tesque distributors in each country.

Not for clinical use

Nacalai Tesque products are not intended for clinical use. While clinical applications may be shown, these products are not validated for clinical use.

I COSMOSIL HPLC COLUMN

1. COSMOSIL/COSMOGEL

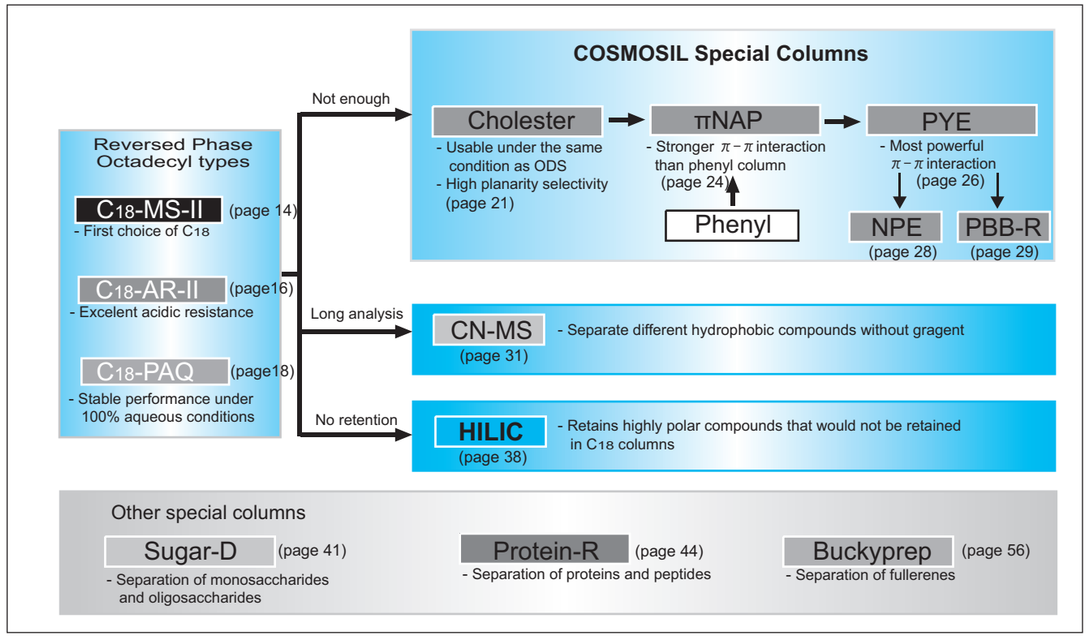
■ General description of the COSMOSIL/COSMOGEL packing materials

Sample	Separation mode	Packing material	Stationary phase	Special fearures and applications	USP category	Page
Organic compounds (low M.W.)	Reversed phase	C_{18}-MS-II	Octadecyl group	Multi-purpose C_{18} column.Monofunctional silylation on ultra-pure silica gel for separation of the widest range of compounds	L1	14
		C_{18}-AR-II		Multi-purpose C_{18} column using ultrapure silica gel. Features strong acid resistance and suitable for a wide range of separation	L1	16
		C_{18}-PAQ		Reversed phase column, compatible with 100% water based mobile phases	L1	18
		Cholester	Cholesteryl group	Usable under the same condition as C_{18}. Unique rigid cholesteryl structure improves separation		21
		πNAP	Naphthylethyl group	Stronger π-π interaction than phenyl column		24
		PYE	Pyrenylethyl group	The most powerful π-π interaction		26
		NPE	Nitrophenylethyl group	Separation utilizing π-π interaction and Dipole-dipole interaction		28
		PBB-R	Pentabromobenzyl group	Separation utilizing dispersion force		29
		CN-MS	Cyanopropyl group	Great reproducibility using isocratic elution mode	L10	31
		C_{22}-AR-II	Docosyl group	Alkyl chain columns except C_{18} column		32
		C_8-MS	Octyl group		L7	
		C_4-MS	Butyl group		L26	
		TMS-MS	Trimethyl group		L13	
		PE-MS	Phenylethyl group	π-π interaction	L11	
	Normal phase	SL-II	**	Normal Phase chromatography with nonpolar organic solvents	L3	36
	Hydrophilic interaction	HILIC	Triazole	Retains highly polar compounds that would not be retained in C_{18} column		38
Monosaccharides Oligosaccharides	Hydrophilic interaction	Sugar-D	Secondary/Tertiary amine	A novel stationary phase for saccharide separation. Extended column life and increased stability. Alternative to aminopropyl type		41
		NH_2-MS	Aminopropyl group	Primary amine bonded column		43
Proteins	Reversed phase	Protein-R	Octadecyl group	The most suitable reverse phased column for proteins		44
		C_{18}-AR-300	Octadecyl group	Wide pore type reversed phase columns with high acid resistance recommended for the separation of proteins, polypeptides, nucleic acids and other large molecules	L1	46
		C_8-AR-300	Octyl group		L7	
		C_4-AR-300	Butyl group		L26	
		Ph-AR-300	Phenyl group		L11	
	Gel permeation	Diol-120-II	Diol group	Silica-based gel filtration column for high speed separation of proteins and water soluble polymer	L20	48
		Diol-300-II				
	Ion-exchange	DEAE	Diethylaminoethyl type	Weak anion-exchange		50
		QA	Quarternary ammonium type	Strong anion-exchange	L23	
		CM	Carboxymethyl type	Weak cation-exchange		
		SP	Sulfopropyl type	Strong cation-exchange		
	Hydrophobic interaction	HIC	**	Hydrophobic interaction charomatography column for protein separation		53
Fullerenes	**	Buckyprep	Pyrenylpropyl group	Standard column for fullerenes separation		56
		Buckyprep-M	Phenothiazinyl group	Designed to separate metallofullerenes		57
		PBB	Pentabromobenzyl group	Designed for the preparative separation of fullerenes using carbon disulphide,o-dichlorobenzene and toluene		58
		NPE	Nitrophenylethyl group	Separation of derivatived fullerenes		59
		PYE	Pyrenylethyl group	Separation of fullerenes and structural isomer		
Carbon nanotubes	Gel permeation	CNT-300 NEW	Hydrophilic group (neutral)	Separation of soluble carbon nanotubes		60
		CNT-1000 NEW				
		CNT-2000 NEW				

For old type columns, please refer to page 61.

2. Column selection guide

■ COSMOSIL columns selection guide



■ COSMOSIL columns selection guide

● Organic compounds (low M.W.)

Octadecyl group bonded column (C_{18},ODS) are recommended as first-choice columns for separations of organic compounds (low M.W.). If there is not enough separation or no retention using COSMOSIL C_{18} columns, COSMOSIL series offer many kinds of specialty columns.

- ◦ Medicines
- ◦ Crude drugs
- ◦ Natural compounds
- ◦ Pesticides
- ◦ Food additives
- ◦ Vitamins
- ◦ Lipids etc.

● Saccharides

- ◦ COSMOSIL Sugar-D is recommended for the separation of monosaccharides and oligosaccharides as a first-choice column.
- ◦ For the separation of sugar derivatives, COSMOSIL C_{18}-PAQ is suitable as well.

● Proteins

- ◦ Please select based on the separation mode. Please refer to page 44.

● Fullerenes

- ◦ COSMOSIL Buckyprep is most suitable for the separation of fullerenes.

3. COSMOSIL silica packing material

Introduction

Superior HPLC columns can be produced only with excellent packing materials and superb packing technique. COSMOSIL columns are well known for their high efficiency and high-resolution separations. Based on spherical, totally porous silica, COSMOSIL columns provide enhanced chemical and mechanical stability as well as very high surface coverage.

The selection of the C_{18} chemistries available enables the chromatographer to tailor separation to special applications. The ultra pure silica based MS-II series with widely extended pH range are developed for improved separation of basic compounds. The C_{18} AR-II phase provides increased acid resistance. Four unique bonded chemistries are available for COSMOSIL specialty columns: Cholester, πNAP, PYE and HILIC. These specialty columns may improve the separation compared with conventional columns. Five highly effective phases for fullerene separation are also available: Buckyprep, Buckyprep-M, PBB, PYE and NPE. COSMOGEL packing materials are non-silica based and provide superior in ion exchange columns.

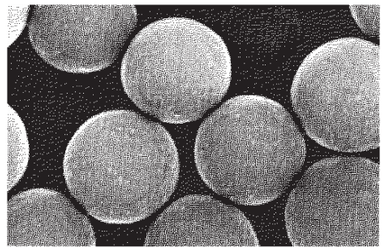
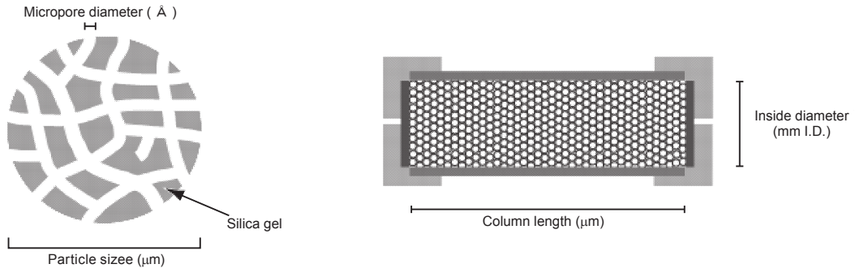


Figure. Microscopic photograph of the silica gel

Packing material and view showing a frame format of column



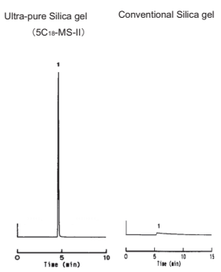
Raw material silica gel

COSMOSIL is based on ultra pure porous spherical silica gel (purity: 99.99% or higher). Low-purity silica gel contains metal impurity which may cause interference in the separation, especially for metal coordination compounds.

Effect of metal impurity

Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 50/50
Flow rate: 1.0 ml/min
Temperature: 30 °C
Detection: UV254nm

Sample: Paeonol



Metal coordination compounds

The compounds, which have 2 or more hydroxyl groups, carboxyl groups, carbonyl groups and/or amino groups in the adjacent positions, can complex with metal impurity, which results in peak tailing.

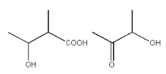


Table. Metal content percentage (ppm)

Packing material	Metal content (ppm)						
	Al	Ca	Fe	Mg	Na	Ti	Total
Ultra pure silica gel	4	10	11	3	12	<1	41
Normal silica gel	32	450	26	88	56	134	786

Stationary phase construction

While C_{18} columns are most widely used in reversed phase HPLC, it is important to distinguish between two very different bonded phase formats. Monomeric type C_{18} format incorporates the bonding of the C_{18} alkyl chain to a single silica atom on the silica gel backbone. Monomeric type columns such as the COSMOSIL C_{18}-MS-II and the MS series have excellent synthesis reproducibility, very good lot-to-lot reproducibility and short mobile phase equilibration times. On the other hand, the polymeric C_{18} format incorporates a tri-functional silylation procedure whereby the octadecyl group is bonded to 2 or 3 silica atoms on the silica gel backbone. This increases silylation results in far greater column stability particularly in acidic mobile phase conditions. Stereo recognition capability is also greater than that of the monofunctional silylation type C_{18} columns. The polymeric format is offered in the AR-II and the entire AR-300 series of COSMOSIL columns. Please refer to product descriptions and application chromatograms for selection guidance.

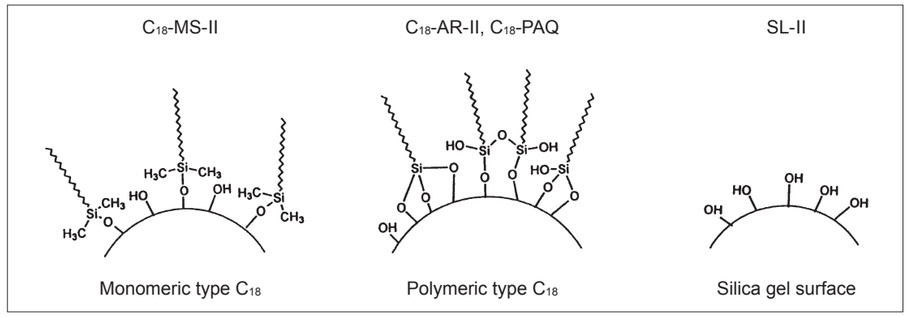


Figure. Diagrams of different stationary phase constructions (before end-capping treatment)

End-capping treatment

The silanols (Si-OH groups) on the silica surface provided bonding site for stationary phases. However, part of the silanol groups remain un-capped as residual silanol groups even after the end-capping treatment, they cause peak tailing for basic compounds. COSMOSIL packing materials for reversed phase chromatography are of near-perfectly end-capped residual silanol groups.

$R\text{-}NH^+$ (Basic compounds)

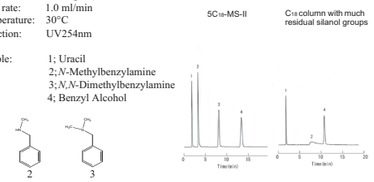
$Si\text{-}O^-$ (Free silanol group)

Basic compound can form ionic bonds with residual free silanols. The ionic bonding causes peak tailing of basic compounds if a silicabased column is not perfectly end-capped.

Effect of residual silanol

Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH7) = 20/80
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

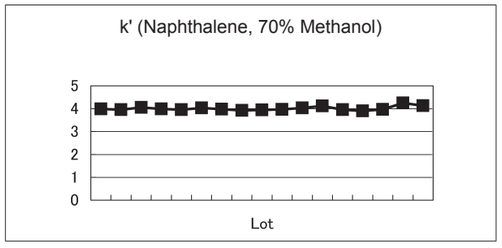
Sample: 1; Uracil
2; *N*-Methylbenzylamine
3; *N,N*-Dimethylbenzylamine
4; Benzyl Alcohol



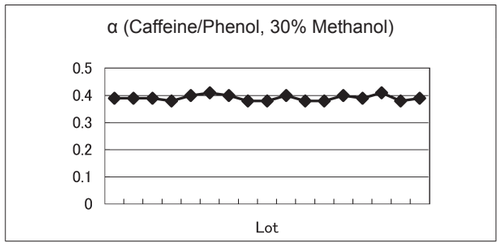
Synthesis reproducibility

By using strictly selected silica gel and constant synthesis conditions, the chemically bonded type column retains a variance of the capacity factor (k') between synthetic lots of within ±10% and a variance of the separation factor (α) of within ± 5%.

The figures below show in graphic form the lot inspection results of synthesized packing material (COSMOSIL $5C_{18}$-MS-II). Figure 1 shows the variance of stationary phase (octadecyl group) introduced volume which is the basic indicator of the quality of the packing material. Figure 2 shows the end-capping efficiency of the packing material. The variance among the lots is reduced to the minimum in the COSMOSIL packed columns.



Fuigure 1. Variance of the combining volume between silica gel and C_{18}



Fuigure 2. Variance of end capping efficiency of the packing material

4. Performance guarantee

1) Quality guarantee of packing materials

The strict quality control system of Nacalai Tesque supports the customers with an individual “Inspection Report” which accompanies each and every COSMOSIL and COSMOGEL Packed Column (except guard columns) and an additional “Certificate of Analysis” for the COSMOSIL 5C_{18}-MS-II and 5C_{18}-AR-II (4.6 mm I.D. x 150 mm and 4.6 mm I.D. x 250 mm).

- Validated columns

Product name	Product number	Column size
COSMOSIL 5C_{18}-MS-II	38019-81	4.6 mm I.D. × 150 mm
	38020-41	4.6 mm I.D. × 250 mm
COSMOSIL 5C_{18}-AR-II	38144-31	4.6 mm I.D. × 150 mm
	38145-21	4.6 mm I.D. × 250 mm
COSMOSIL Cholester	05976-61	4.6 mm I.D. × 150 mm
	05977-51	4.6 mm I.D. × 250 mm
COSMOSIL HILIC	07056-51	4.6 mm I.D. × 150 mm
	07057-41	4.6 mm I.D. × 250 mm

- COSMOSIL certificate of analysis

Validate terms of the physical properties of the silica gel, the carbon content, polar selectivity, hydrophobicity, silanol capacity, steric selectivity, inactive degree to basic and chelating compounds.

Certificate of Analysis MS-Ⅱ

COSMOSIL 5C_{18}-MS-Ⅱ GEL LoT No. 29

		Specification	Results
Base silicagel material			
Median Particle Size			
50% cum vol	[μm]	4.3－4.6	4.5
Surface Area	[m2/g]	320－350	321
Pore Volume	[ml/g]	0.9－1.1	0.9
Median Pore Diameter	[nm]	11.0－13.0	11.8
Carbon content	[%]	15.5－17.5	15.6
Atomic Emission	[ppm]		
Al		≦5	1.5
Fe		≦20	8.3
Ti		≦0.5	0.1
Na		≦20	1.7
Chromatographic Results			
TEST A			
α[k´(Methyl Benzoate)/k´(Benzene)]		≦0.80	0.73
α[k´(Toluene)/k´(Benzene)]		≧1.60	1.76
TEST B			
α[k´(Caffeine)/k´(Phenol)]		≦0.44	0.40
TEST C			
α[k´(N-Acetyl Procaiamide /k´(Benzyl Alcohol)]		≦0.60	0.6
α[N(N'-Acetyl Procainamide) /N(Benzyl Alcohol)]		≧0.30	0.38
TEST D			
α[k´(8-Quinolinol /k´(Propylbenzene)]		≦0.14	0.09
α[N(8-Quinolinol /N(Propylbenzene)]		≧0.15	0.17

Nacalai Tesque Inc.
Kyoto, Japan

Approved : Quality Control Dept.

Name: K. Iwaguchi Date: 2009.8.21

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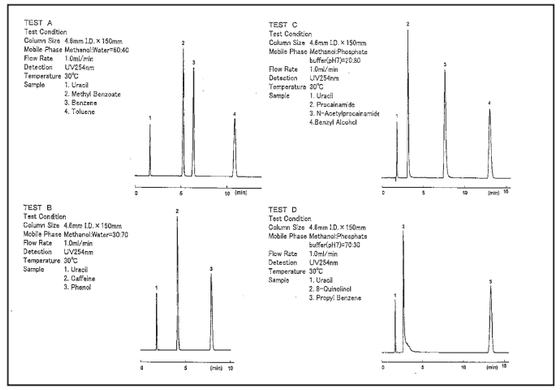
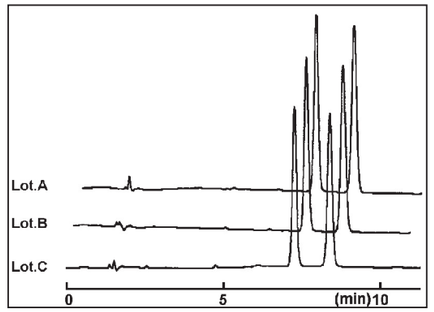


- 3 lot numbers

3 lot numbers are available.

Please contact us. (info.intl@nacalai.com)



2) Quality guarantee of COSMOSIL packed columns

Inspection report contains data of number of theoretical plates (N), peak asymmetry (s), capacity factor (k’) and separation factor (α) and pressure.

Inspection report

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* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*  CODE No.  3801981                                                      *
*  COSMOSIL PACKED COLUMN  5C18-MS-II                                    *
*                    SIZE   4.6 I.D.x 150 mm                             *
*                    TYPE   WATERS                                       *
*                 MANF. No.  ******                                      *
*                   GEL Lot.  28                                         *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
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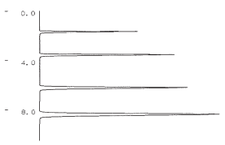


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TEST CONDITION
      MOBILE PHASE          METHANOL:WATER = 70:30
      FLOW RATE             1.0 ml/min
      TEMPERATURE           30℃
      DETECTION             UV 254 nm
      CHART SPEED           0.5 cm/min
      PRESSURE              7.2 MPa

SAMPLE                      CAPACITY FACTOR
  ( ORDER OF ELUTION )      ----
1: URACIL
2: METHYL BENZOATE          1.12
3: TOLUENE                  2.72
4: NAPHTHALENE              4.01


SEPARATION FACTOR
                  ALPHA-1= 2.42
                  ALPHA-2= 1.48

THEORETICAL PLATES (LAST PEAK)
                    = 13100
            ( GUARANTEE   10,000 <=TP )

PEAK ASYMMETRY (10% HEIGHT OF LAST PEAK)
                    = 1
            ( GUARANTEE   0.86 <=PA<= 1.25 )

MOBILE PHASE AT SHIPMENT: METHANOL:WATER = 70:30

OPERATOR

                                  NACALAI TESQUE, INC. KYOTO JAPAN
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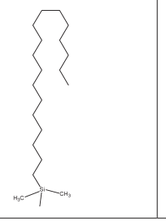
5. Reversed phase chromatography

1) Octadecyl types

Introduction

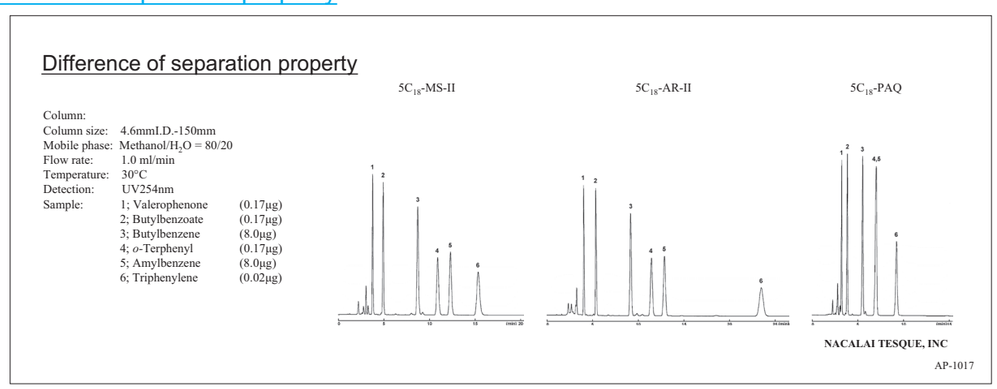
The reversed phase HPLC column is most commonly used because of the high theoretical plate number, excellent separation characteristics, reproducibility, affordable cost and ease of use. Columns packed with the octadecyl group bonded type silica gel (C_{18}, ODS) are the most widely employed. We offer three types of octadecyl group bonded columns: COSMOSIL C_{18}-MS-II, C_{18}-AR-II and C_{18}-PAQ, each of which has a different separation property.

Material characteristics

Packing material	C_{18}-MS-II	C_{18}-AR-II	C_{18}-PAQ
Silica gel	High purity porous spherical silica		
Average particle size	3, 5, 15 µm※	3, 5, 15 µm	5, 15 µm
Average pore size	approx. 120 Å		
Specific surface area	approx. 300 m^2/g		
Stationary phase			
	Octadecyl group		
Bonding type	Monomeric	Polymeric	
Main interaction	Hydrophobic interaction		
End-capping treatment	Near-perfect treatment		
Carbon content	approx. 16%	approx. 17%	approx. 11%
pH range	2 ～10※※	1.5 ～7.5※※	2 ～7.5
Feature	This phase is recommended for most applications but particularly effective for basic compounds.	This phase is recommended for separations requiring acidic mobile phase conditions. It also shows superior molecular shape selectivity to monomeric type C_{18} columns.	This phase is designed to offer superior retention of polar compounds and excellent reproducibility in highly aqueous mobile phases, even in 100% aqueous.

※For 2.5C_{18}-MS-II, please refer to page 34.
※※Optimum pH range of columns based on silica gel is between 2 and 7.5.

Difference of separation property



Column selection based on application data

We prepare following application data to help you select separation conditions.

- COSMOSIL Chromatogram Index

More than 6,100 single compound elution profiles with full chromatographic condition description are available. They are not only an incredible help for chromatographers, but also can be used as references in choosing conditions for similar compounds.
These data are available at our web site: http://www.nacalai.com

- COSMOSIL Application Data

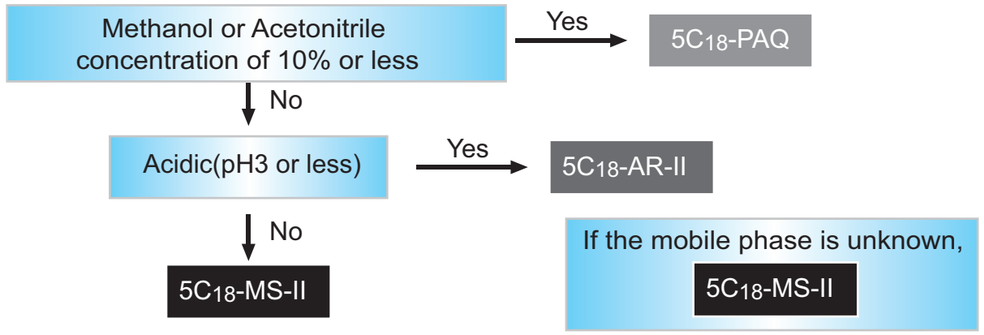
COSMOSIL Application Data is now available on our website. The online version includes more than 1,000 application data using COSMOSIL columns. The online data are searchable by name of sample and column. If you have any questions regarding the application data or separations of compounds not listed here, please feel free to e-mail us at info.intl@nacalai.com.

- Application data of substances in Japanese Pharmacopoeia, 15th version (246 data)

We prepare data of drugs using three kinds of C_{18} columns that are specified in HPLC analysis in application data of substances in Japanese Pharmacopoeia, 15th version. The data are available at our web site.
http://www.nacalai.co.jp/en/cosmosil/TheJP15.htm, or type “COSMOSIL Japanese Pharmacopoeia” at a search site.

Column selection by mobile phase

- If a mobile phase is determined, use the following chart to select an appropriate COSMOSIL column.
- Refer to application data above for choosing a mobile phase of new analysis.
- Adjustment of pH is required for dissociative compounds.
- Generally acidic mobile phase is suitable for acidic compounds, and neutral mobile phase is suitable for basic compounds.
- If you are not sure about the mobile phase, try C_{18}-MS-II first.



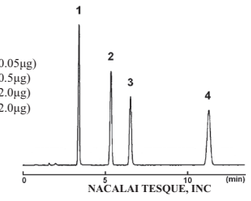
C_{18}-MS-II

The COSMOSIL 5C_{18}-MS-II is a well-balanced column with better basic performance such as sharper peaks of basic compounds and chelating compounds, and high theoretical plate number. It is the most popular HPLC column because we produce very consistent products and minimize variation from lot-to-lot. Furthermore we provide abundant application data with the column, so it will help you to choose an analysis condition of your sample.

Separation property

Column: 5C_{18}-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample:
1; Acetophenone (0.05µg)
2; Methyl Benzoate (0.5µg)
3; Benzene (2.0µg)
4; Toluene (2.0µg)



AP-0421

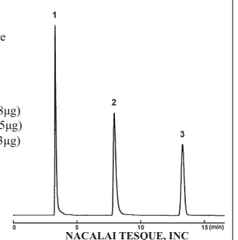
Column	Hydrophobic interaction α(Toluene/Benzene)	Pressure (MPa)	Theoretical plates number(Toluene)
COSMOSIL 5C_{18}-MS-II	1.96	8.3	14300
A company C_{18}	1.99	13.0	16800
B company C_{18}	1.94	8.0	14000
C company C_{18}	1.69	11.2	5600
D company C_{18}	1.84	10.5	14200

Analysis of basic compounds and metal coordination compounds

The COSMOSIL 5C_{18}-MS-II column, taking advantage of a new end-capping treatment, can replace the original COSMOSIL C_{18} (ODS) column. A new end-capping treatment with polar groups for "shield effect" has significantly improved peak shape for basic compounds. Ultra pure silica gel with low trace-metal content is used for COSMOSIL columns; thus the columns provide excellent peak shapes for chelating compounds.

Basic compounds

Column: 5C_{18}-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH7) = 20/80
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm
Sample:
1; Procainamide (0.38µg)
2; *N*-Acetylprocainamide (0.25µg)
3; Benzylalcohol (5.63µg)

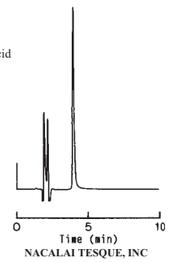


AP-1010

Metal coordination compounds

Column: 5C_{18}-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile / 20mmol/l Phosphoric Acid = 5/95
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV240nm

Sample: Oxine-copper



AP-0143

Validation

The strict quality control system of Nacalai Tesque supports the customers with an individual “Inspection Report” which accompanies each and every COSMOSIL and COSMOGEL Packed Column (except guard columns) and an additional “Certificate of Analysis” for the COSMOSIL 5C_{18}-MS-II (4.6 mm I.D. x 150 mm and 4.6 mm I.D. x 250 mm). For more informations, please refer to page 10.

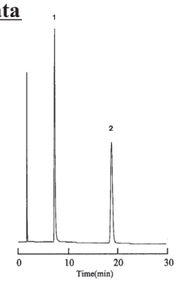
Application data

● Parasympatholytic agents

COSMOSIL Application Data

Column: 5C_{18}-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH7) = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm, 0.2AUFS

Sample: 1; Atropine Sulfate
2; Scopolamine Hydrobromide



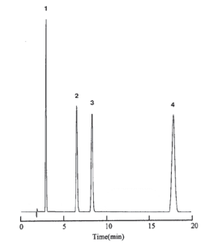
AP-0064

● Analgesic antipyretic drugs

COSMOSIL Application Data

Column: 5C_{18}-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH7) = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.16AUFS

Sample: 1; Acetoaminophen
2; Antipyrine
3; *4*-Aminoantipyrine
4; Phenacetin



AP-0070

Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL 5C_{18}-MS-II Packed Column

Column size I.D. x length (mm)	Product number
1.0× 50	02824-31
1.0×150	02896-01
2.0× 30	05876-71
2.0× 50	04355-21
2.0×100	05597-31
2.0×150	38025-91
2.0×250	05761-61
3.0×100	05458-51
3.0×150	34245-31
3.0×250	34254-11
4.6× 30	34341-61
4.6× 50	38017-01

Column size I.D. x length (mm)	Product number
4.6×100	38018-91
4.6×150	38019-81
4.6×150 3 lots set※	09397-73
4.6×250	38020-41
6.0×150	38021-31
6.0×250	38022-21
10× 50	05789-21
10×150	34355-91
10×250	38023-11
20×150	05091-41
20×250	38024-01
28×250	05760-71

COSMOSIL 5C_{18}-MS-II Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	38014-31
4.6×10 Cartridge※※	38015-89
10×20	38016-11
20×20	05790-81
20×50	34371-71
28×50	34347-01

※ For 4.6×150 3 lots set, please refer to page 11.
※※ 3 cartridges included, needs a holder. Please refer to page 76.

● Preparative column (Particle size: 15 µm)

COSMOSIL 15C_{18}-MS-II Packed Column

Column size I.D. x length (mm)	Product number
28×250	34525-61
50×250	05886-41
50×500	34531-71

COSMOSIL 15C_{18}-MS-II Guard Column

Column size I.D. x length (mm)	Product number
28×50	05885-51
50×50	34527-41

● Fast LC column (Particle size: 3 µm)

COSMOSIL 3C_{18}-MS-II Packed Column

Column size I.D. x length (mm)	Product number
2.0× 50	05514-01
4.6× 10	38065-71
4.6× 50	38066-61
4.6×100	38067-51

For more informations, please refer to page 33 for 15C_{18}-MS-II and page 34 for 2.5C_{18}-MS-II.
For flow rate and and device of semi-micro columns, or preparative columns, please refer to page 175.

C_{18}-AR-II

The COSMOSIL 5C_{18}-AR-II packed column features a polymeric type of C_{18} reversed phase material. The column employs an ultra-pure silica gel low in metal impurities and has near-perfect end-capping. In addition, it has stronger acid resistance than the COSMOSIL 5C_{18}-AR. The COSMOSIL 5C_{18}-AR-II column is especially effective for the separation of chelating compounds as well as both acidic and basic compounds.

Acid resistance

The acidic resistance of COSMOSIL 5C_{18}-AR-II is much improved compared with commercially available monomeric type octadecyl stationary phases. It retains high performance even in case of acidic mobile phases commonly used to separate acidic compounds and peptides.

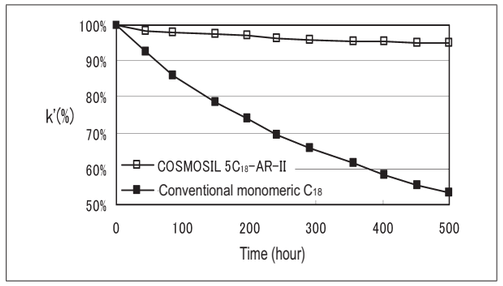


Figure.
Decomposition test in 0.1% Trifluoroacetic acid solution at 60°C.
Capacity factor(k') = Naphthalene,
Mobile phase: 70% Methanol

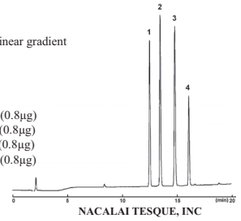
Application data

● Peptides

COSMOSIL Application Data

Column: 5C_{18}-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-H_2O
B; 0.05%TFA-Acetonitrile
B conc. 10→40% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Oxytocin (0.8μg)
2; Angiotensin II(Human) (0.8μg)
3; Angiotensin I(Human) (0.8μg)
4; Substance P (0.8μg)



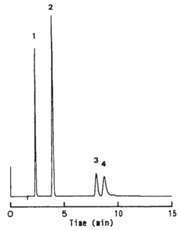
NACALAI TESQUE, INC
AP-0351

● Organic acids

COSMOSIL Application Data

Column: 5C_{18}-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphoric Acid = 20/80
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.5AUFS

Sample: 1; Gallic Acid (0.63μg)
2; Protocatechuic Acid (0.63μg)
3; Gentisic Acid (0.63μg)
4; Phthalic Acid (0.63μg)



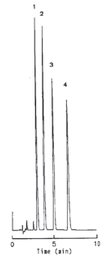
NACALAI TESQUE, INC
AP-0159

● Salicylic acid esters

COSMOSIL Application Data

Column: 5C_{18}-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.2AUFS

Sample: 1; Methyl Salicylate (2.3μg)
2; Ethyl Salicylate (2.6μg)
3; Propyl Salicylate (2.3μg)
4; Butyl Salicylate (2.6μg)



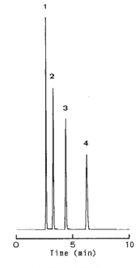
NACALAI TESQUE, INC
AP-0165

● Parabens

COSMOSIL Application Data

Column: 5C_{18}-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.12AUFS

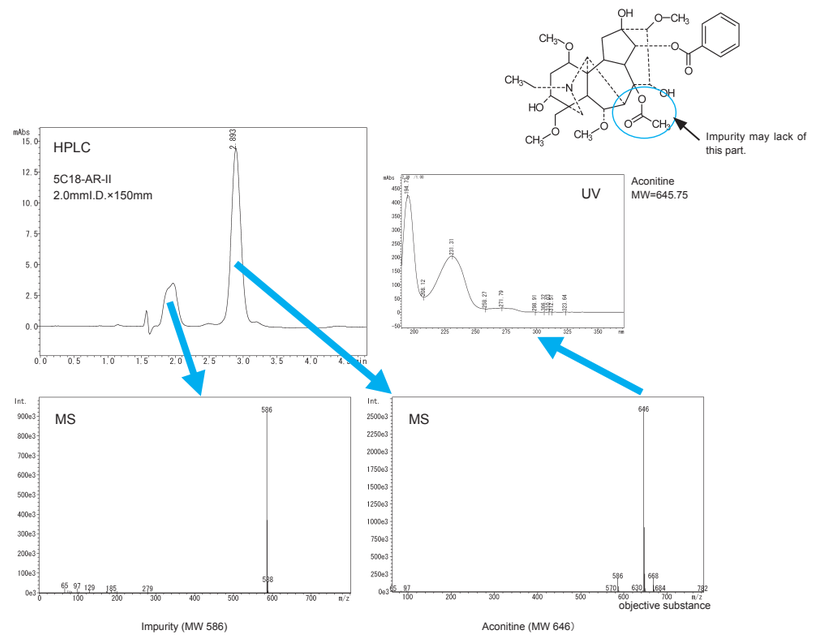
Sample: 1; Methyl *p*-Hydroxybenzoate (0.125μg)
2; Ethyl *p*-Hydroxybenzoate (0.125μg)
3; Propyl *p*-Hydroxybenzoate (0.125μg)
4; Butyl *p*-Hydroxybenzoate (0.125μg)



NACALAI TESQUE, INC
AP-0099

LC/MS Application data

● Identification of herbal medicine constituents by LC/MS



Ordering information

● Analytical / Preparative column (Particle size: 5 μm)

COSMOSIL 5C_{18}-AR-II Packed Column

Column size I.D. x length (mm)	Product number
1.0× 50	02955-21
1.0×150	02951-61
2.0× 30	05098-71
2.0× 50	34400-81
2.0×100	34469-11
2.0×150	37992-51
2.0×250	05272-71
3.0×100	05791-71
3.0×150	38028-61
3.0×250	38029-51
4.6× 30	05877-61
4.6× 50	38142-51

Column size I.D. x length (mm)	Product number
4.6×100	38143-41
4.6×150	38144-31
4.6×150 3 lots set※	09396-83
4.6×250	38145-21
6.0×150	38146-11
6.0×250	38147-01
10× 50	05369-21
10×150	34350-41
10×250	38149-81
20×150	34316-01
20×250	38150-41
28×250	34362-91

COSMOSIL 5C_{18}-AR-II Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	38141-61
4.6×10 Cartridge※※	38008-89
10×20	38148-91
20×20	34458-51
20×50	34479-81
28×50	34363-81

※ For 4.6×150 3 lots set, please refer to page 11.
※※ 3 cartridges included, needs a holder.
Please refer to page 76.

● Preparative column (Particle size: 15 μm)

COSMOSIL 15C_{18}-AR-II Packed Column

Column size I.D. x length (mm)	Product number
28×250	37978-51
50×250	38058-71
50×500	05884-61

COSMOSIL 15C_{18}-AR-II Guard Column

Column size I.D. x length (mm)	Product number
28×50	38030-11
50×50	38057-81

● Fast LC column (Particle size: 3 μm)

COSMOSIL 3C_{18}-AR-II Packed Column

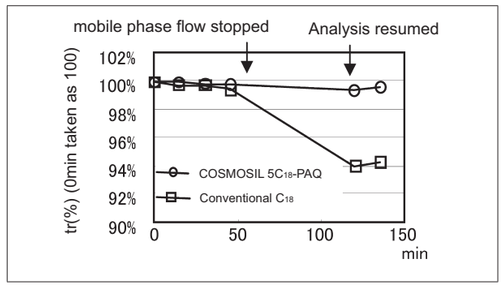
Column size I.D. x length (mm)	Product number
2.0× 50	05478-91
4.6× 10	38068-41
4.6× 50	38069-31
4.6×100	38070-91

For more information on 15C_{18}-AR-II, please refer to page 33.
For flow rate and device of semi-micro columns, or preparative columns, please refer to page 175.

C_{18}-PAQ

The COSMOSIL 5C_{18}-PAQ maintains stable retention time even in 100% aqueous mobile phases. The new polymeric linking style gives this column a strong acidic resistance so that it is compatible with mobile phases of acidic pH that can permanently damage conventional octadecyl stationary phases. This type is especially good for separation of hydrophilic compounds.

Stable performance under 100% aqueous conditions



The figure shows the change of retention time for thymine with 100% aqueous mobile phase (20 mmol/l phosphate buffer pH7). The sample was analyzed 4 times (1 hour). Flow of mobile phase was then stopped for 1 hour. The sample was analyzed under the same condition again after 1 hour. The conventional C_{18} column showed change of retention time, but COSMOSIL 5C_{18}-PAQ maintained stable retention time.

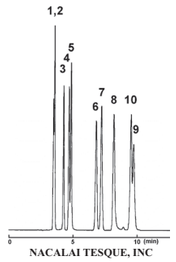
Application data

● Organic acids

COSMOSIL Application Data

Column: 5C_{18}-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphate buffer(pH2.5)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample:
1; Glycolic Acid (6.3µg)
2; Tartaric Acid (4.0µg)
3; Malic Acid (6.4µg)
4; Lactic Acid (13µg)
5; Acetic Acid (13µg)
6; Citric Acid (6.3µg)
7; Succinic Acid (13µg)
8; Maleic Acid (0.06µg)
9; Propionic Acid (13µg)
10; Fumaric Acid (0.03µg)



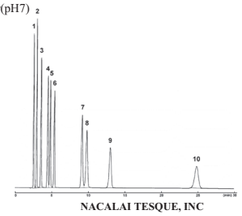
NACALAI TESQUE, INC
AP-1058

● Nucleobases and Nucleosides

COSMOSIL Application Data

Column: 5C_{18}-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: 20mmol/l Phosphate buffer(pH7)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm

Sample:
1; Cytosine (0.16µg)
2; Uracil (0.16µg)
3; Cytidine (0.32µg)
4; Uridine (0.24µg)
5; Guanine (0.16µg)
6; Thymine (0.16µg)
7; Adenine (0.08µg)
8; Guanosine (0.24µg)
9; Thymidine (0.24µg)
10; Adenosine (0.16µg)



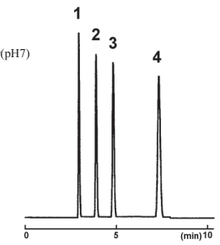
NACALAI TESQUE, INC
AP-0375

● dNTPs

COSMOSIL Application Data

Column: 5C_{18}-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphate buffer(pH7)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm, 0.16AUFS

Sample:
1; *d*CTP (1mmol/l)
2; *d*TTP (1mmol/l)
3; *d*GTP (1mmol/l)
4; *d*ATP (1mmol/l)
Injection 0.5µl



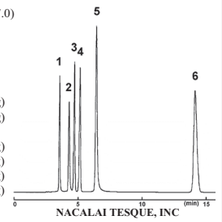
NACALAI TESQUE, INC
AP-0371

● Catecholamines

COSMOSIL Application Data

Column: 5C_{18}-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphate buffer(pH7.0)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV270nm

Sample:
1; *L*-Noradrenaline (0.38µg)
2; *L*-Adrenaline (0.38µg)
3; *DL*-3-Methoxy -*d*-hydroxymandelic Acid (0.56µg)
4; *L*-DOPA (0.56µg)
5; Dopamine Hydrochloride (1.13µg)
6; Homovanillic Acid (1.13µg)



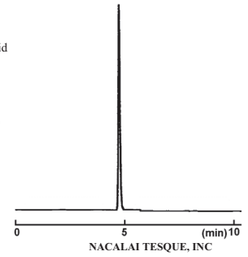
NACALAI TESQUE, INC
AP-1056

● Ascorbic acid

COSMOSIL Application Data

Column: 5C_{18}-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphoric Acid
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV245nm, 0.16AUFS

Sample: Ascorbic Acid (0.1µg)



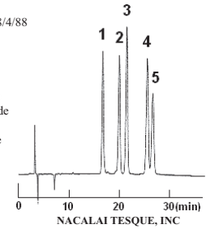
NACALAI TESQUE, INC
AP-0372

● 2-Phenylethyl glycosides

COSMOSIL Application Data

Column: 5C_{18}-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ Methanol/ H_2O = 8/4/88
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample:
1; 2-Phenylethyl-ß-melibioside
2; 2-Phenylethyl-ß-gentiobioside
3; 2-Phenylethyl-ß-lactoside
4; 2-Phenylethyl-ß-cellobioside
5; 2-Phenylethyl-ß-maltoside



NACALAI TESQUE, INC

Data courtesy of Dr. K. Sakata, Dr. B. Shimizuoto, Institute for Chemical Research, Kyoto University

Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL 5C_{18}-PAQ Packed Column

Column size I.D. x length (mm)	Product number
1.0× 50	05792-61
1.0×150	05793-51
2.0× 30	05878-51
2.0× 50	05794-41
2.0×100	05470-71
2.0×150	34449-71
2.0×250	05795-31
3.0×100	05796-21
3.0×150	05797-11
3.0×250	05798-01
4.6× 30	05879-41
4.6× 50	34451-21

Column size I.D. x length (mm)	Product number
4.6×100	05799-91
4.6×150	02486-71
4.6×250	02485-81
6.0×150	34419-61
6.0×250	05800-41
10× 50	05801-31
10×150	34466-41
10×250	34376-21
20×150	34476-11
20×250	34373-51
28×250	34456-71

COSMOSIL 5C_{18}-PAQ Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	02484-91
10×20	34457-61
20×20	05803-11
20×50	05804-01
28×50	34455-81

● Preparative column (Particle size: 15 µm)

COSMOSIL 15C_{18}-PAQ Packed Column

Column size I.D. x length (mm)	Product number
28×250	05888-21
50×250	05890-71
50×500	05891-61

COSMOSIL 15C_{18}-PAQ Guard Column

Column size I.D. x length (mm)	Product number
28×50	05887-31
50×50	05889-11

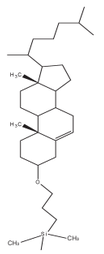
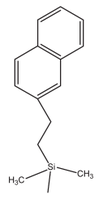
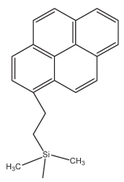
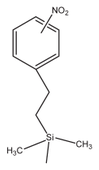
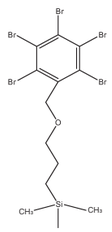
For more information on 15C_{18}-PAQ, please refer to page 33.
For flow rate and device of semi-micro columns, or preparative columns, please refer to page 175.

2) Special culumns

Introduction

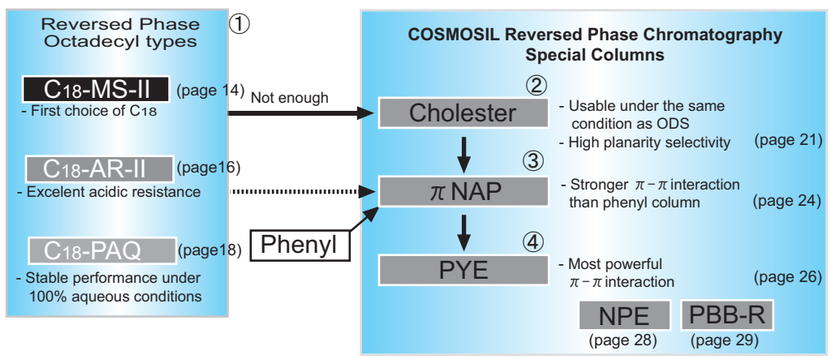
Reversed phase HPLC columns have been widely used because of their superior resolution, high theoretical plate number and ease of use. Since hydrophobic interaction is the dominant separation mechanism in reversed phase chromatography, conventional stationary phases such as C_{18} and C_8 do not offer optimum selectivity for compounds with similar hydrophobicity. COSMOSIL offers a broad selection of columns with unique stationary phases for separation of these difficult analytes. These columns offer improved separation of structurally similar compounds that are difficult to analyze with a C_{18} type column.

Material characteristics

Packing material	Cholester	πNAP	PYE	NPE	PBB-R
Silica gel	High purity porous spherical silica				
Average particle size	5 μm※	5 μm			
Average pore size	approx.120 Å				
Specific surface area	approx.300 m²/g				
Stationary phase					
	Cholesteryl group	Naphtylethyl proup	Pyrenylethyl group	Nitrophenylethyl group	Pentabromobezyl group
Bonding type	Monomeric type				
Main interaction	-Hydrophobic interaction -Molecular shape selectivity	-Hydrophobic interaction -π-π interaction	-Hydrophobic interaction -π-π interaction -Dispersion force -Charge-tansfer interaction	-Hydrophobic interaction -π-π interaction -Dipole-dipole interaction	-Hydrophobic interaction -Dispersion force
End-capping treatment	Near-perfect treatment				
Carbon content	approx.20%	approx.11%	approx.18%	approx.9%	approx.8%
Feature	-Usable under condition the same as C_{18} -High molecular sharp selectivity	-Stronger π-π interaction than phenyl column	-Strongest π-π interaction	-Dipole-dipole interaction	-Dispersion force interaction

※ For 2.5 μm particle size, please refer to page 34.

Column slection guide

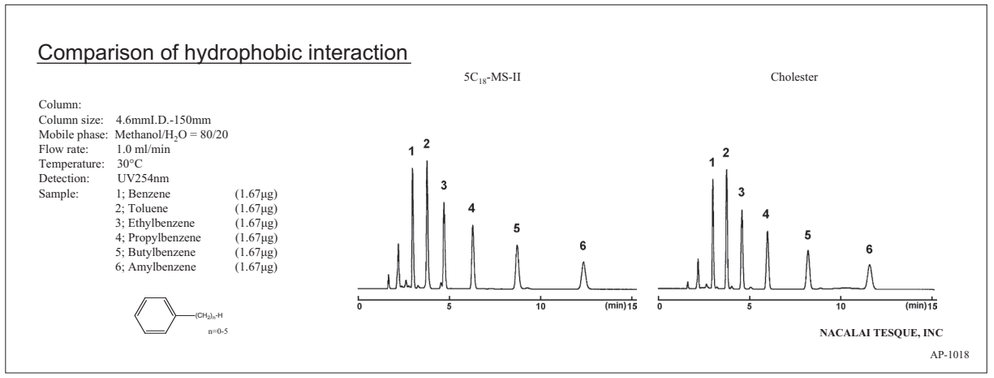


Cholester

COSMOSIL Cholester is a reversed phase HPLC column with cholesteryl groups bonded silica packing material, which provides equivalent hydrophobicity like traditional alkyl group bonded silica packing materials (C_{18}, C_{30}). However, Cholester offers strong molecular shape selectivity for hydrophobic compounds to yield unique and reproducible separation patterns following the same analytical conditions used with other ODS columns.

Hydrophobic interaction

Figure shows the comparison of hydrophobic interactions with competitive C_{18} columns. Cholester provides the same hydrophobicity as alkyl group bonded types (C_{18}, C_{30}). It is not necessary to change the analytical conditions when replacing C_{18} or C_{30} columns with Cholester.



Molecular shape selectivity

The stationary phase of Cholester has very rigid structures and can distinguish different molecular shapes. Cholester offers improved separation for structurally similar compounds that are difficult to analyze with alkyl group bonded materials (C_{18} and C_{30}). As in the following example Cholester retains planar Triphenylene longer than stereoscopic o-Terphenyl.

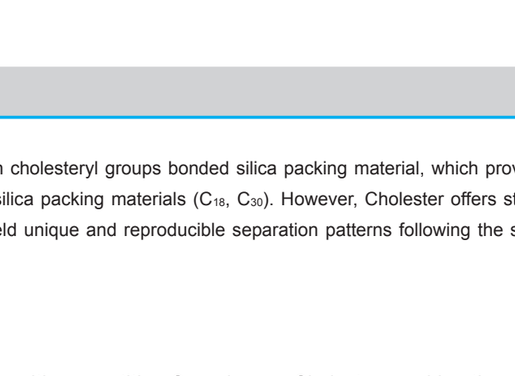
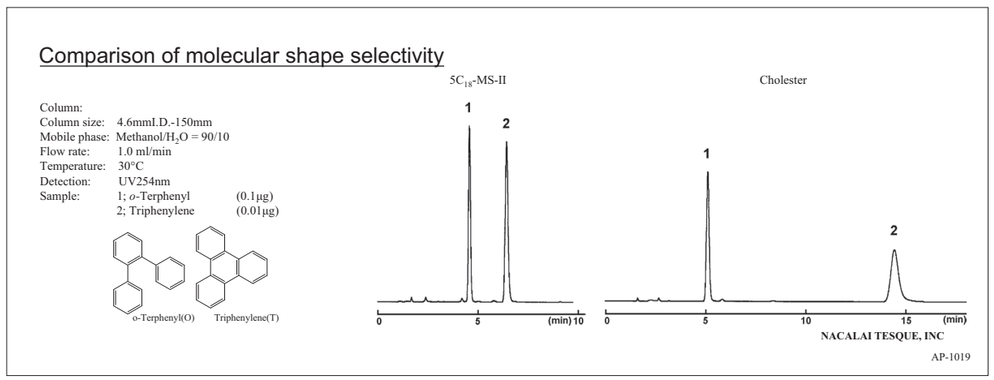
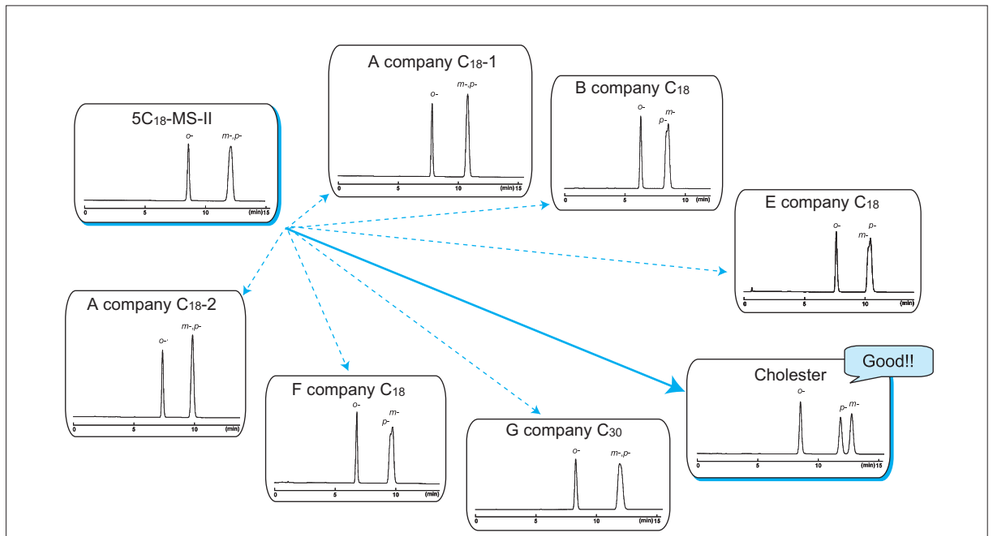


Fig. Comparison of molecular sharp selectivity



Improvement in separation

COSMOSIL Cholester provides enhanced selectivity over traditional C_{18} columns and offers greater performance in separating isomers or other closely related compounds. COSMOSIL Cholester is ideal for method development and serves as an excellent alternative to traditional C_{18} columns. The figure below shows analytical data of chloroacetophenone isomers. These isomers are difficult to separate with C_{18} and C_{30}, but they are well resolved by COSMOSIL Cholester.



※Particle size: 5 µm (except F company: 3 µm)

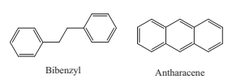
Mobile phase: 50% methanol, sample: Chloroacetophenone

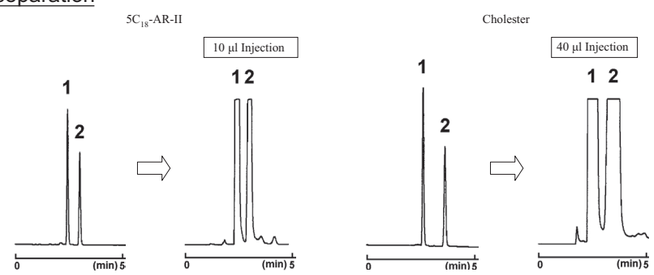
Efficiency of preparative separation

The figure below shows the comparison of efficiency of preparative separation with a C_{18} column. Both columns show good separation. However, sample loading capacity for preparative separations can be affected by a slight difference in separation ability. COSMOSIL Cholester can load 4 times of sample volume compared with C_{18} columns.

Comparison of preparative separation

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm
Sample: 1; Bibenzyl
2; Anthracene





NACALAI TESQUE, INC

Application data

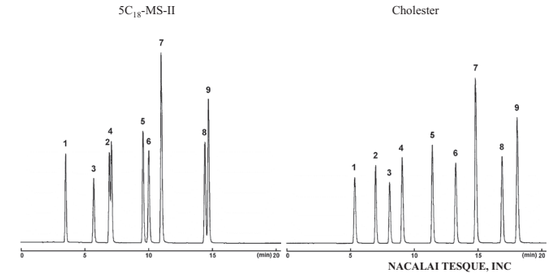
● Catechins

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: A: Acetonitrile/ 20mmol/l Phosphate buffer(pH2.5) = 10/90
B: Acetonitrile/ 20mmol/l Phosphate buffer(pH2.5) = 30/70
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm
Sample:

1; Gallocatechin(GC)	(0.80mg/ml)
2; Caffeine	(0.08mg/ml)
3; Epigallocatechin(EGC)	(0.80mg/ml)
4; Catechin (C)	(0.40mg/ml)
5; Epicatechin(EC)	(0.40mg/ml)
6; Epigallocatechin gallate(EGCG)	(0.20mg/ml)
7; Gallocatechin gallate(GCG)	(0.40mg/ml)
8; Epicatechin gallate(ECG)	(0.20mg/ml)
9; Catechin gallate(CG)	(0.20mg/ml)

Injection Vol. 1.0µl



NACALAI TESQUE, INC

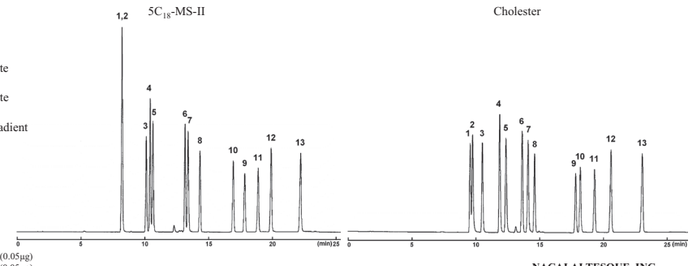
AP-1072

● Flavones

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: A: Acetonitrile/ 20mmol/l Phosphate buffer(pH2.5) = 20/80
B: Acetonitrile/ 20mmol/l Phosphate buffer(pH2.5) = 70/30
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm
Sample:

1; Fisetin	(0.25µg)		
2; Myricetin	(0.20µg)		
3; 7,8-Dihydroxyflavone	(0.05µg)		
4; Luteolin	(0.20µg)		
5; Quercetin	(0.20µg)		
6; 7-Hydroxyflavone	(0.10µg)	10; Chrysin	(0.05µg)
7; Baicalein	(0.05µg)	11; 6-Methoxyflavone	(0.05µg)
8; 6-Hydroxyflavone	(0.05µg)	12; 3-Hydroxyflavone	(0.25µg)
9; Flavone	(0.05µg)	13; 5-Hydroxyflavone	(0.05µg)



NACALAI TESQUE, INC

AP-1032

Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL Cholester Packed Column

Column size I.D. x length (mm)	Product number
1.0×150	05968-71
1.0×250	05969-61
2.0× 30	08565-51
2.0× 50	06352-91
2.0×100	06948-01
2.0×150	05971-11
2.0×250	05972-01
3.0×150	05973-91
3.0×250	05974-81

Column size I.D. x length (mm)	Product number
4.6×150	05976-61
4.6×150 3 lots set※	07970-03
4.6×250	05977-51
10×150	08011-91
10×250	05979-31
20×150	06088-71
20×250	05982-71
28×250	05985-41

※ For 4.6×150 3 lots set, please refer to page 11.

COSMOSIL Cholester Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	05975-71
10×20	05978-41
20×20	05980-91
20×50	05981-81
28×50	05983-61

※ For 2.5 µm particle size, please refer to page 34

πNAP

COSMOSIL πNAP is a reversed phase HPLC column with naphthylethyl group bonded silica packing material. The naphthylethyl group is composed of two fused aromatic rings and forms strong π-π interactions with unsaturated compounds. This column offers improved separation of compounds such as positional isomers that are difficult to analyze with alkyl group bonded materials.

Comparison of π-π interactions

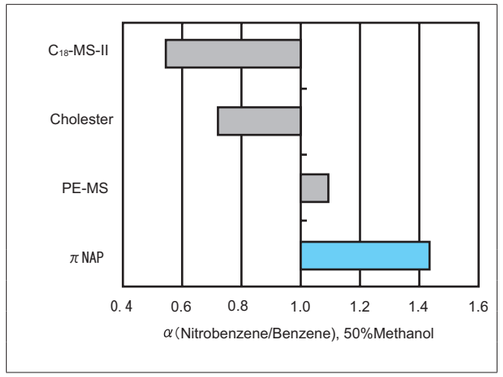
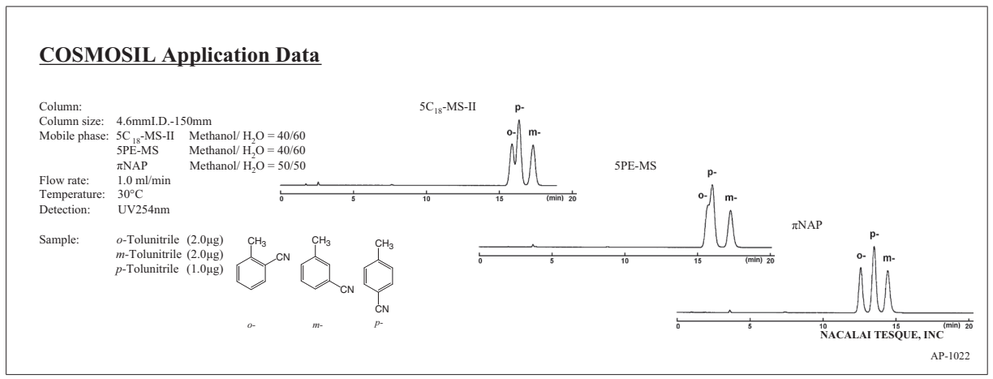


Figure. Comparison of π-π interaction

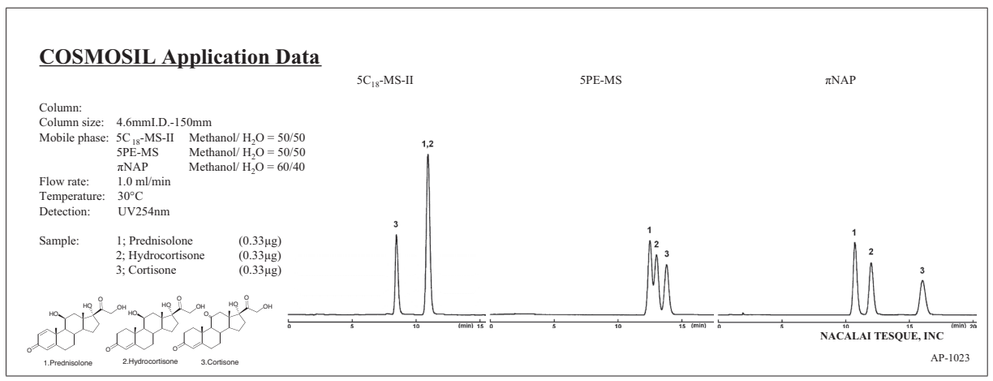
COSMOSIL πNAP shows stronger π-π interactions than phenyl columns.

Application data

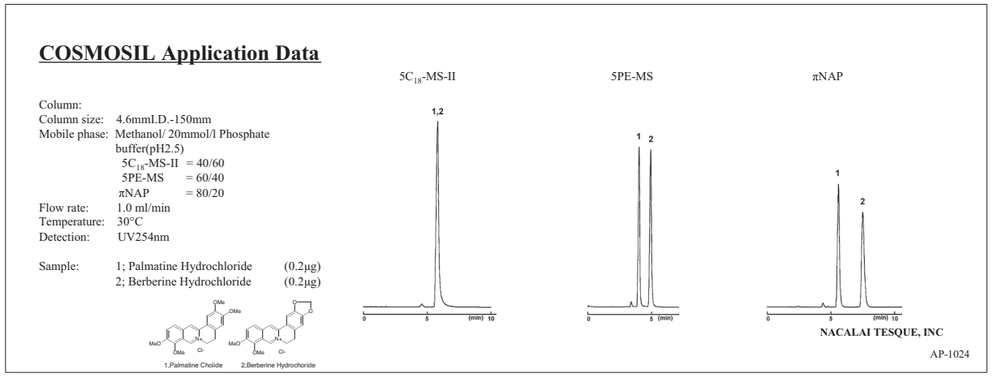
● Tolunitriles



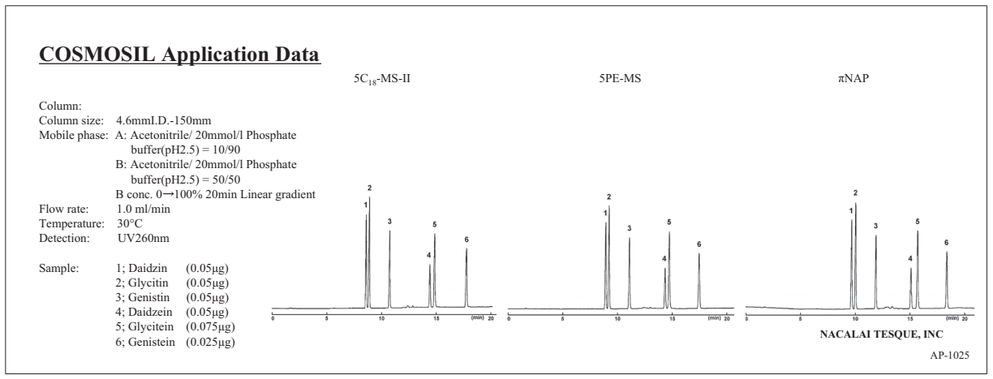
● Adrenal Cortical Hormones



● Berberines



● Isoflavones



Orderling information

● Analytical / Preparative column (Particle size: 5 μm)

COSMOSIL πNAP Packed Column

Column size I.D. x length (mm)	Product number
1.0×150	08076-61
1.0×250	08077-51
2.0× 30	08566-41
2.0× 50	08567-31
2.0×100	08299-51
2.0×150	08078-41
2.0×250	08079-31
3.0×150	08080-91

Column size I.D. x length (mm)	Product number
3.0×250	08081-81
4.6×150	08085-41
4.6×250	08086-31
10×150	08088-11
10×250	08089-01
20×150	08092-41
20×250	08093-31
28×250	08095-11

COSMOSIL πNAP Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	08082-71
10×20	08087-21
20×20	08090-61
20×50	08091-51
28×50	08094-21

PYE

COSMOSIL PYE column is a reversed phase column with 2-(1-pyrenyl) ethyl groups bonded silica packing material. This column utilizes π-π interactions originating from the planar pyrene ring structure to separate structural isomers.

Comparison π-π interaction

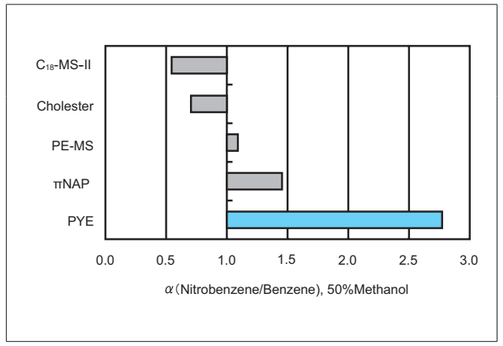
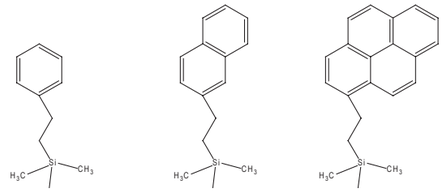


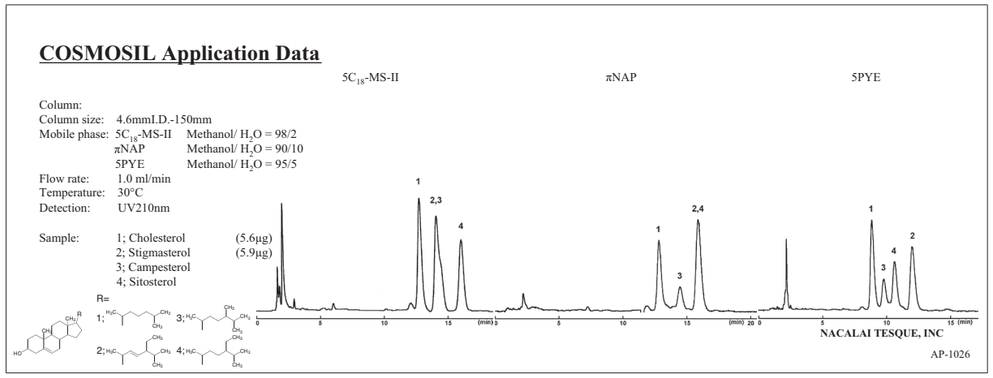
Figure. Comparison of π-π interactions

COSMOSIL PYE provides much stronger π-π interactions than πNAP.

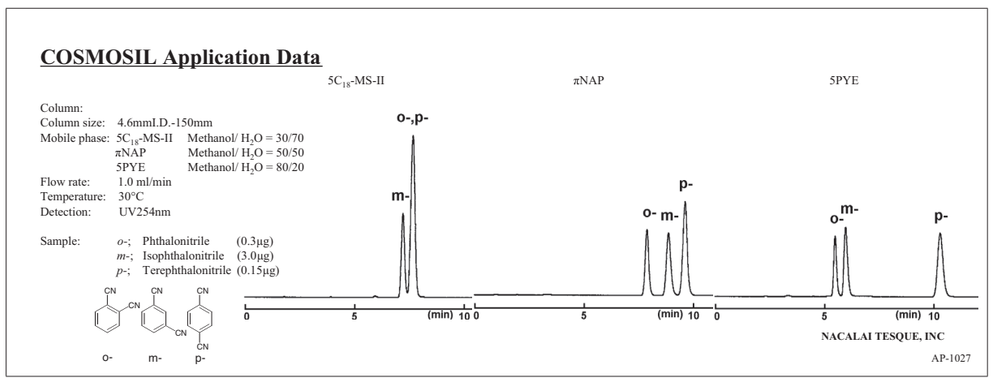


Application data

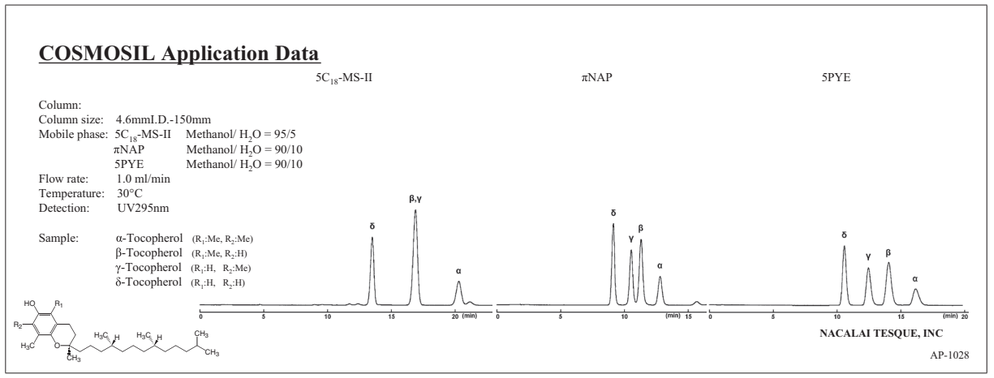
● Sterols



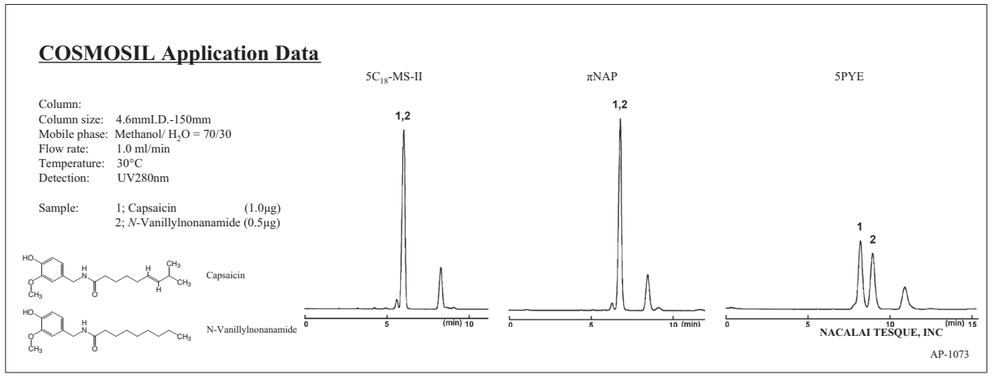
● Phthalonitriles



● Tocopherols



● Capsaicins



Attention

1. Methanol is recommended as a mobile phase for COSMOSIL PYE column. Acetonitrile is not recommended because it has many π electrons and interferes π-π interactions between a sample and the stationary phase.
2. The stationary phase of COSMOSIL PYE, nitrophenyl group, has a large UV absorption. When the stationary phase detaches from silica gel and elutes, even a slight quantity can be detected and causes baseline noise. In such a case, wash the column with tetrahydrofuran. Detachment of a small amount of the stationary phase does not deteriorate a column's separation ability.
3. COSMOSIL PYE column is not suitable for gradient analysis.

Orderling information

● Analytical / Preparative column (Particle size: 5 μm)

COSMOSIL 5PYE Packed Column

Column size I.D. x length (mm)	Product number
1.0×150	02851-71
2.0×150	38042-61
2.0×250	34450-31
4.6×150	37837-91
4.6×250	37989-11
10×250	37996-11
20×250	38044-41

COSMOSIL 5PYE Guard Column

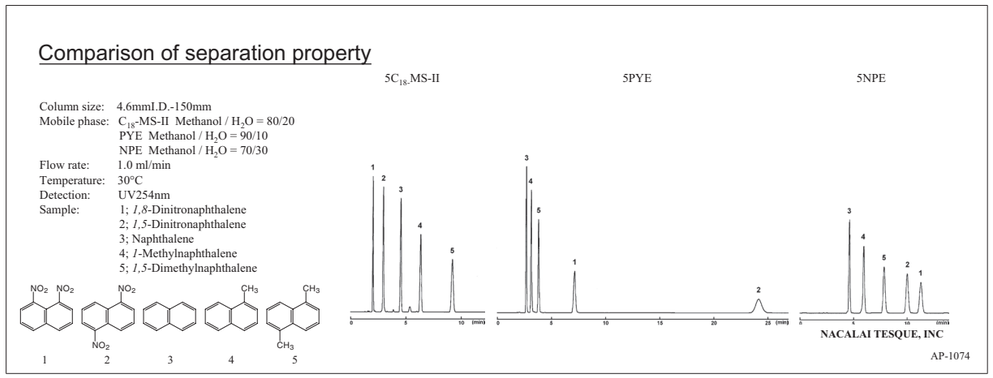
Column size I.D. x length (mm)	Product number
4.6×10	37903-11
10×20	38041-71
20×20	05867-91
20×50	34475-21

NPE

COSMOSIL NPE column is a reversed phase column with nitrophenylethyl groups bonded silica packing material. This column provides unique retention characteristics, slightly different from the COSMOSIL PYE column, utilizing both dipole-dipole and π-π interactions.

Selectivity for dipole-dipole interactions

COSMOSIL NPE strongly retains 1,8-dinitronaphthalene because of the strong dipole formed by the two nitro groups positioned on the same side of naphthalene.



Attention

1. Methanol is recommended as a mobile phase for COSMOSIL NPE column. Acetonitrile is not recommended because it has many π electrons and interferes π-π interactions between a sample and the stationary phase.
2. The stationary phase of COSMOSIL NPE, nitrophenyl group, has a large UV absorption. When the stationary phase detaches from silica gel and elutes, even a slight quantity can be detected and causes baseline noise. In such a case, wash the column with tetrahydrofuran. Detachment of a small amount of the stationary phase does not deteriorate a column's separation ability.
3. COSMOSIL NPE column is not suitable for gradient analysis.

Orderling information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL 5NPE Packed Column

Column size I.D. x length (mm)	Product number
1.0×150	05897-01
2.0×150	34328-51
2.0×250	34379-91

Column size I.D. x length (mm)	Product number
4.6×150	37902-21
4.6×250	37990-71
10×250	05469-11
20×250	38046-21

COSMOSIL 5NPE Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	37904-01
10×20	38045-31
20×20	05868-81
20×50	05869-71

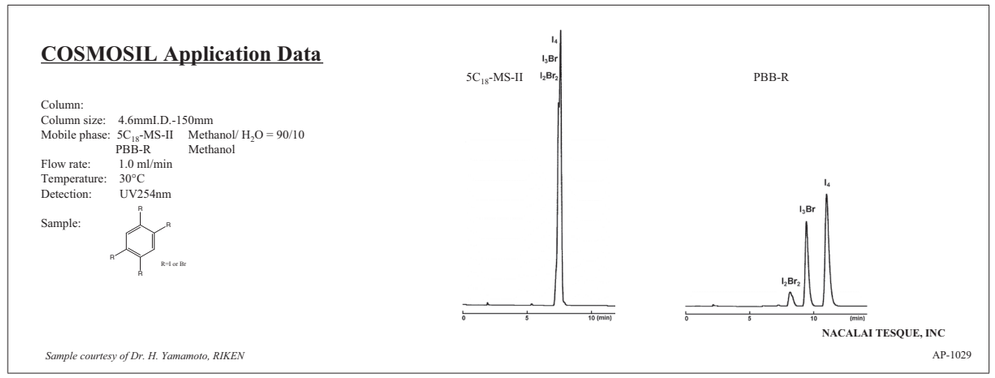
PBB-R

COSMOSIL PBB-R is a reversed phase column with pentabromobenzyl groups bonded silica packing material. This column provides unique selectivity for structurally similar compounds utilizing the dispersion force interaction. The dispersion force interaction of COSMOSIL PBB-R makes it useful for separation of structural isomers differing only by a double bond.

Application data

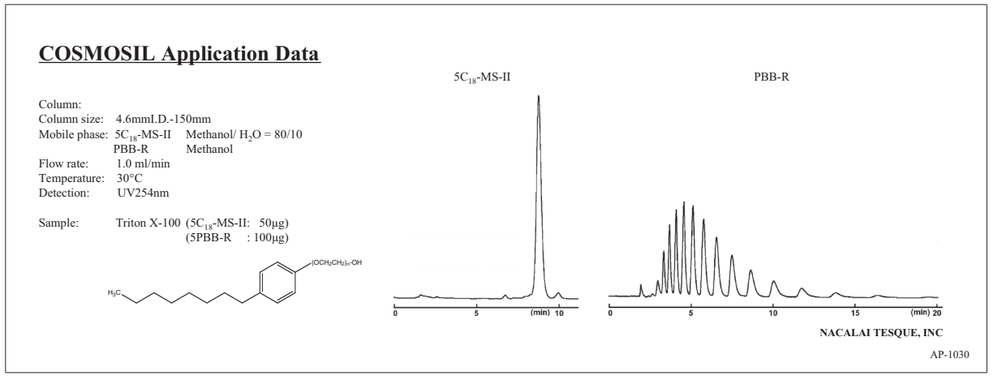
● Halogen exchange reaction products

COSMOSIL PBB-R strongly retains iodine atom which has a large dispersion force, than bromine atom. So it can separate halogen exchange reaction products that are difficult to analyze with C_{18} column.



● Surfactant agents

C_{18} column can not separate Triton X-100 mixturem, because (-OCH_2CH_2-) group has little hydrophobicity. However, COSMOSIL PBB-R can separate them because it distinguishes difference in the dispersion force, which depends on its molecular weight.



Orderling information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL 5PBB-R Packed Column

Column size I.D. x length (mm)	Product number
1.0×150	05899-81
2.0×150	05900-31
2.0×250	05904-91

Column size I.D. x length (mm)	Product number
4.6×150	05697-21
4.6×250	05698-11
10×250	05699-01
20×250	05700-51

COSMOSIL 5PBB-R Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	05704-11
10×20	05721-81
20×20	05911-91
20×50	05722-71

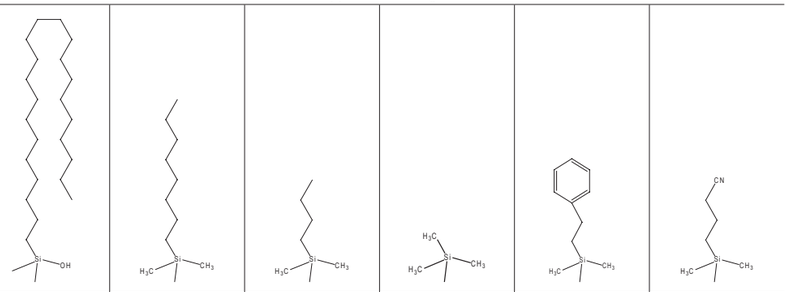
3) Other columns

Introduction

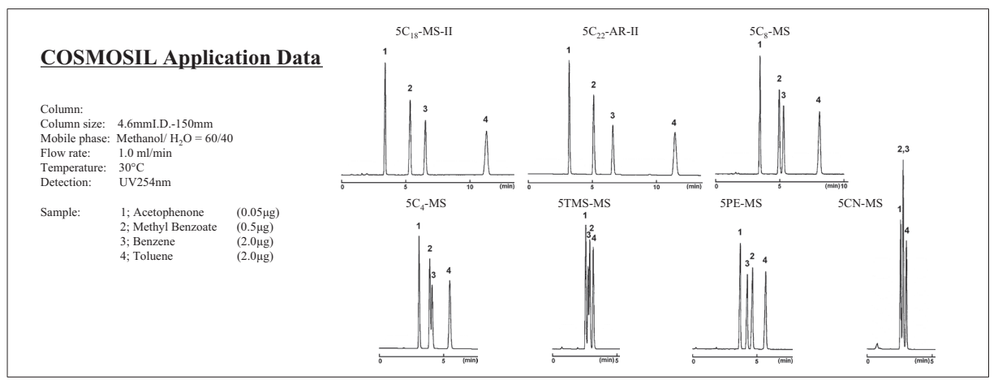
COSMOSIL alkyl type columns also include stationary phases with packing materials of C_{22} (Dococyl group), C_8 (Octyl group), C_4 (Butyl group) and TMS (Trimethyl group). The order of retention force by hydrophobicity of each packing material is C_{22}=C_{18}>C_8>C_4>TMS. The columns having lower hydrophobicity than C_{18} or C_{22} are effective for separation of high hydrophobic compounds and compounds with big difference in hydrophobic. Hydrophobicity of C_{22} is about the same as C_{18}. However, stereoselectivity of C_{22} is higher than C_{18}, and so C_{22} may provide better separation.

The COSMOSIL PE-MS columns (phenylethyl group) and the COSMOSIL CN-MS columns (cyanopropyl group) provide a secondary separation mode (π-π interaction). These columns are recommended when the other alkyl chain stationary phases do not offer optimum selectivity for structurally similar compounds.

Material characteristics

Packing material	C_{22}-AR-II	C_8-MS	C_4-MS	TMS-MS	PE-MS	CN-MS
Silica gel	High purity porous spherical silica					
Average particle size	5 µm					
Average pore size	approx. 120 Å					
Specific surface area	approx. 300 m^2/g					
Stationary phase						
	Dococyl group	Octyl group	Butyl group	Trimethyl group	Phenylethyl group	Cyanopropyl group
Bonding type	Polymeric	Monomeric				
Main interaction	Hydrophobic interaction				Hydrophobic interaction π-π interaction	
End-capping treatment	Near-perfect treatment					
Carbon content	approx. 19%	approx. 10%	approx. 7%	approx. 5%	approx. 10%	approx. 7%

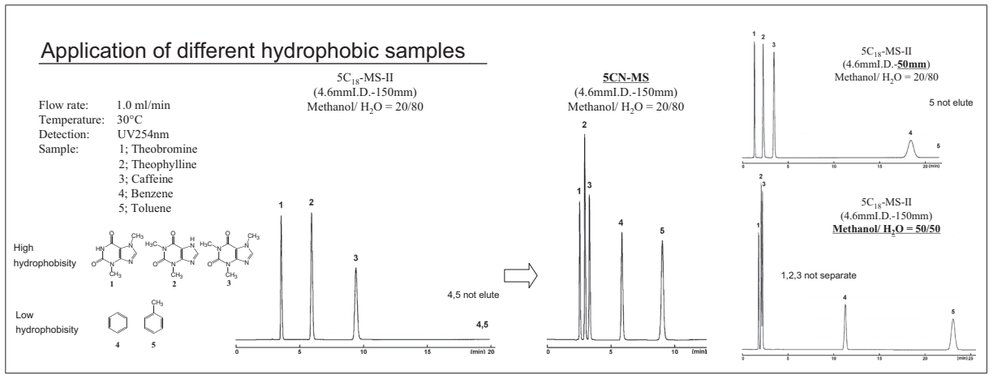
Different of separation characteristic



CN-MS

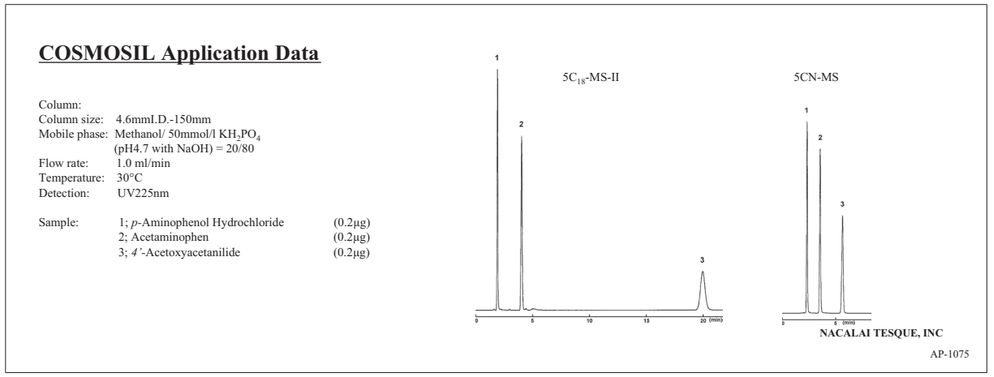
Gradient elution is commonly used for the samples containing both polar and non-polar compounds. However, gradient elution may cause reproducibility problem depending on the gradient mixer and pump, and need an equilibration time for each analysis. COSMOSIL 5CN-MS offers rapid analysis and great reproducibility using isocratic elution mode.

Rapid analysis of samples containing both polar and non-polar compounds



Application data

- Acetoaminophen



Orderling information

- Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL 5CN-MS Packed Column

Column size I.D. x length (mm)	Product number
4.6× 50	38233-61
4.6×100	38234-51
4.6×150	38235-41
4.6×250	38236-31

Column size I.D. x length (mm)	Product number
6.0×150	38237-21
6.0×250	38238-11
10×250	38239-01
20×250	38240-61

COSMOSIL 5CN-MS Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	38231-81
10×20	38232-71

C_{22}-AR-II, C_8-MS, C_4-MS, TMS-MS, PE-MS

Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL 5C_{22}-AR-II Packed Column

Column size I.D. x length (mm)	Product number
4.6× 50	05848-41
4.6×100	05849-31
4.6×150	04598-51
4.6×250	04599-41
6.0×150	05850-91
6.0×250	05851-81
10×250	04969-91
20×250	05183-41

COSMOSIL 5C_{22}-AR-II Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	04881-21
10×20	05554-81

COSMOSIL 5C_8-MS Packed Column

Column size I.D. x length (mm)	Product number
4.6× 50	38153-11
4.6×100	38154-01
4.6×150	38155-91
4.6×250	38156-81
6.0×150	38157-71
6.0×250	38158-61
10×250	38159-51
20×250	38160-11

COSMOSIL 5C_8-MS Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	38151-31
10×20	38152-21

COSMOSIL 5C_4-MS Packed Column

Column size I.D. x length (mm)	Product number
4.6× 50	38163-81
4.6×100	38164-71
4.6×150	38165-61
4.6×250	38166-51
6.0×150	38167-41
6.0×250	38168-31
10×250	38169-21
20×250	38170-81

COSMOSIL 5C_4-MS Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	38161-01
10×20	38162-91

COSMOSIL 5TMS-MS Packed Column

Column size I.D. x length (mm)	Product number
4.6× 50	38173-51
4.6×100	38174-41
4.6×150	38175-31
4.6×250	38176-21
6.0×150	38177-11
6.0×250	38178-01
10×250	38179-91
20×250	38180-51

COSMOSIL 5TMS-MS Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	38171-71
10×20	38172-61

COSMOSIL 5PE-MS Packed Column

Column size I.D. x length (mm)	Product number
4.6× 50	38183-21
4.6×100	38184-11
4.6×150	38185-01
4.6×250	38186-91
6.0×150	38187-81
6.0×250	38188-71
10×250	38189-61
20×250	38190-21

COSMOSIL 5PE-MS Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	38181-41
10×20	38182-31

4) Silica based preparative columns

15C_{18}-MS-II, 15C_{18}-AR-II, 15C_{18}-PAQ

COSMOSIL series is available in 10 mm I.D. and 20 mm I.D. for semi-preparative applications and 28 mm I.D. and 50 mm I.D. for preparative scales. For column sizes and packing materials not listed below, contact either your local distributor or the manufacturer directly.

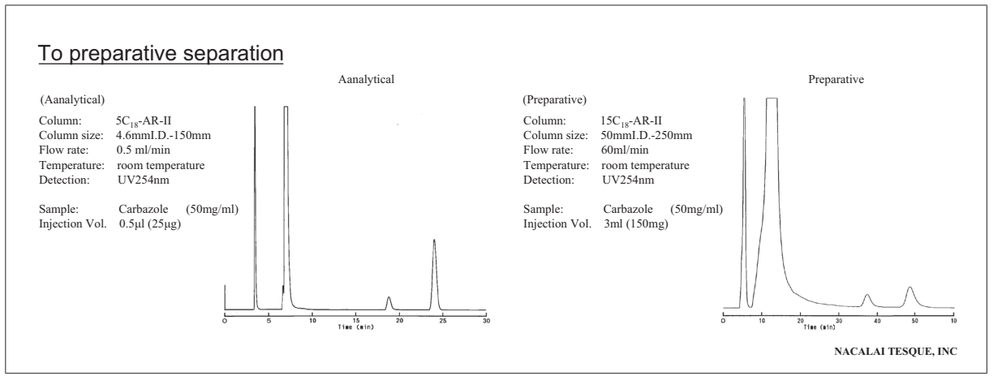
Material characteristics

Packing material	15C_{18}-MS-II	15C_{18}-AR-II	15C_{18}-PAQ
Silica gel	High purity porous spherical silica		
Average particle size	15 µm		
Average pore size	approx. 120 Å		
Specific surface area	approx. 300 m^2/g		
Stationary phase	Octadecyl group (please refer to page 12.)		
Bonding type	Monomeric	Polymeric	
Main interaction	Hydrophobic interaction		
End-capping treatment	Near-perfect treatment		
pH range	2 ~10	1.5 ~7.5	2 ~7.5
Carbon content	approx.16%	approx.17%	approx.11%
Feature	This phase is recommended for most of applications but articularly effective for basic organic compounds.	This phase is recommended for the separations requiring acidic mobile phase conditions. It also shows superior molecular shape selectivity to monomeric type C_{18} columns.	This phase is designed to offer superior retention of polar compounds and excellent reproducibility in highly aqueous mobile phases, even in 100% aqueous.

Application data

● Preparative separation using 50 mm I.D. column

Carbazole is extracted from anthracene oil (coal tar) and required high purity because it is often used for analytical applications. Following is the preparative separation of carbazol using a 50 mm I.D. COSMOSIL 15C_{18}-AR-II.



Please refer to TECHNICAL NOTE 8, Inner diameter of column (scale down and scale up) at page 175.

Ordering information

Please refer to page 15 for 15C_{18}-MS-II , page 17 for 15C_{18}-AR-II and page 19 for 15C_{18}-PAQ.

5) Ultra-Fast Liquid Chromatography (UFLC)

2.5C_{18}-MS-II, 2.5Cholester

Ultra-Fast Liquid Chromatography (UFLC) columns filled with sub-2 µm particles have become widely used. Smaller particle columns generate higher pressures, while provide higher theoretical plate number. Therefore the column length should be shorter, and lead to lower resolution. COSMOSIL 2.5Cholester columns provide enhanced selectivity over traditional C_{18} materials, and greater performance in separating isomers or other closely related compounds.

Material characteristics

Packing material	C_{18}-MS-II	Cholester
Silica gel	High purity porous spherical silica	
Average particle size	2.5 µm	
Average pore size	approx. 130 Å	
Specific surface area	approx. 330 m^2/g	
Stationary phase	Octadecyl group	Cholesteryl group
Bonding type	Monomeric	
Main interaction	Hydrophobic interaction	Hydrophobic interaction Molecular shape selectivity
End-capping treatment	Near-perfect treatment	
Carbon content	approx. 18%	approx. 21%
Features	◦First choice of reversed phase column	◦The same mobile phase as C_{18} ◦High molecular shape selectivity

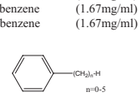
Ultra-Fast Liquid Chromatography

Very fast and efficient separation can be achieved using 2.5 µm particles.
Note: Ultra high pressure liquid chromatography system or some modification of HPLC system is required for UFLC analysis.

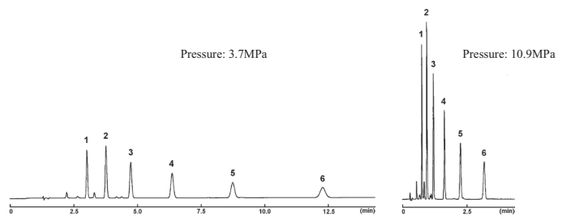
To Ultra Fast Liquid Chromatography

Column: COSMOSIL C_{18}-MS-II
Column size:
Mobile phase: Acetonitrile/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample:
1; Benzene (1.67mg/ml)
2; Toluene (1.67mg/ml)
3; Ethylbenzene (1.67mg/ml)
4; Propylbenzene (1.67mg/ml)
5; Butylbenzene (1.67mg/ml)
6; Amylbenzene (1.67mg/ml)
Injection Vol. 1.0µl



5C_{18}-MS-II(5µm) (4.6mmI.D.-150mm) Pressure: 3.7MPa
2.5C_{18}-MS-II(2.5µm) (3.0mmI.D.-75mm) Pressure: 10.9MPa



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Comparison of analytical pressure

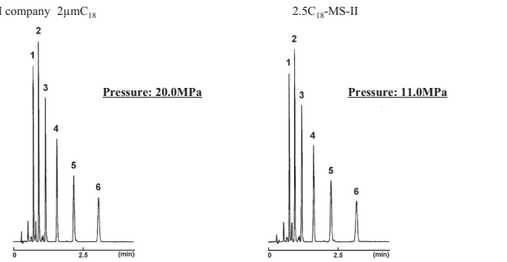
COSMOSIL 2.5Cholester and 2.5MS-II are reversed phase columns with 2.5 µm particle size of silica packing material. It can be used under lower pressure than competitor's 2 µm columns.

COSMOSIL Application Data

Column:
Column size: 3.0mmI.D.-75mm
Mobile phase: Acetonitrile/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample:
1; Benzene (1.67mg/ml)
2; Toluene (1.67mg/ml)
3; Ethylbenzene (1.67mg/ml)
4; Propylbenzene (1.67mg/ml)
5; Butylbenzene (1.67mg/ml)
6; Amylbenzene (1.67mg/ml)
Injection Vol. 1.0µl

H company 2µmC_{18} Pressure: 20.0MPa
2.5C_{18}-MS-II Pressure: 11.0MPa



NACALAI TESQUE, INC

Application data

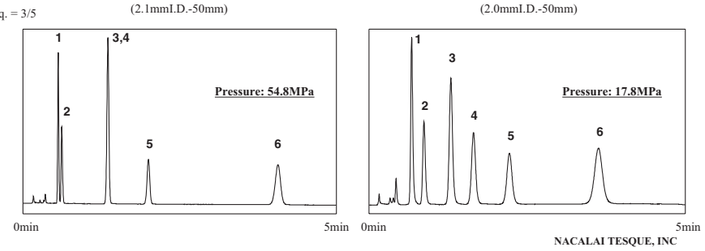
● Saikosaponins

COSMOSIL 2.5Cholester offers improved resolution for compounds difficult to analyze with C_{18} without changing analytical condition.

COSMOSIL Application Data

Mobile phase: Acetonitrile/ 0.05%NaH_2PO_4aq. = 3/5
Flow rate: 0.7 ml/min
Temperature: 50°C
Detection: UV206nm
Sample:
1; Saikosaponin c
2; Saikosaponin h
3; Saikosaponin a
4; Saikosaponin b2
5; Saikosaponin b1
6; Saikosaponin d
Injection Vol. 1.0µl

C company 1.7µmC_{18} (2.1mmI.D.-50mm) Pressure: 54.8MPa
2.5Cholester (2.0mmI.D.-50mm) Pressure: 17.8MPa



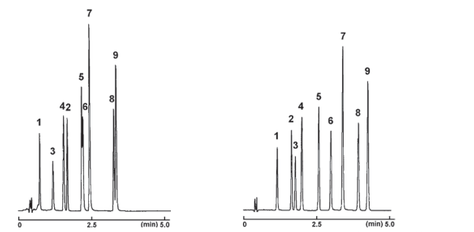
NACALAI TESQUE, INC

● Catechins

COSMOSIL Application Data

Column size: 3.0mmI.D.-75mm
Mobile phase: A: Acetonitrile/ 20mmol/l Phosphate buffer(pH2.5) = 10/90
B: Acetonitrile/ 20mmol/l Phosphate buffer(pH2.5) = 30/70
B conc. 0→100% 5min Linear gradient
Mixer 0.5ml
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV280nm
Sample:
1; Gallocatechin(GC) (0.40mg/ml)
2; Caffeine (0.04mg/ml)
3; Epigallocatechin(EGC) (0.40mg/ml)
4; Catechin (C) (0.20mg/ml)
5; Epicatechin(EC) (0.20mg/ml)
6; Epigallocatechin gallate(EGCG) (0.10mg/ml)
7; Gallocatechin gallate(GCG) (0.20mg/ml)
8; Epicatechin gallate(ECG) (0.10mg/ml)
9; Catechin gallate(CG) (0.10mg/ml)
Injection Vol. 1.0µl

H company 2µmC_{18}
2.5Cholester



NACALAI TESQUE, INC

Orderling information

● Analytical column (Particle size: 2.5 µm)

COSMOSIL 2.5C_{18}-MS-II Packed Column

Column size I.D. x length (mm)	Product number	Column size I.D. x length (mm)	Product number
2.0× 50	08994-31	3.0× 50	08997-01
2.0× 75	08995-21	3.0× 75	08998-91
2.0×100	08996-11	3.0×100	08999-81

COSMOSIL 2.5Cholester Packed Column

Column size I.D. x length (mm)	Product number	Column size I.D. x length (mm)	Product number
2.0× 50	09000-01	3.0× 50	09049-91
2.0× 75	09047-11	3.0× 75	09050-51
2.0×100	09048-01	3.0×100	09051-41

6. Normal phase chromatography

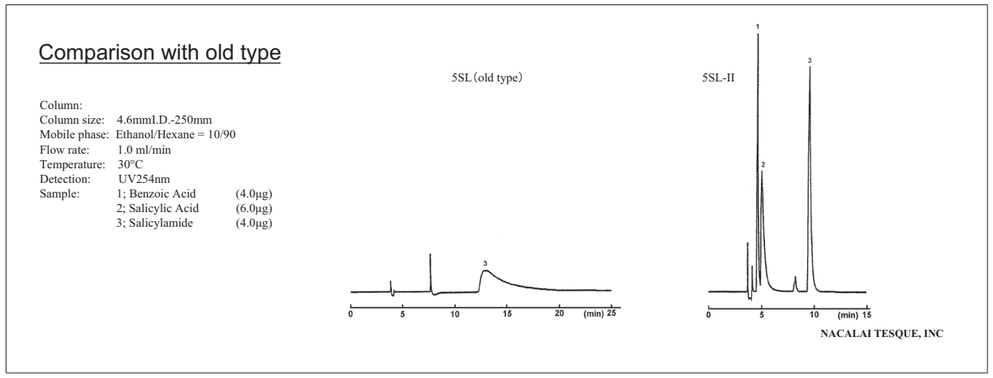
SL-II

Ultra-pure silica gel of more than 99.99% purity is used for the COSMOSIL SL-II packed column series. This column provides improved separation and reproducibility for compounds with carbonyl or phenol hydroxyl groups, which are often problematic to separate using conventional silica gel columns.

Material characteristics

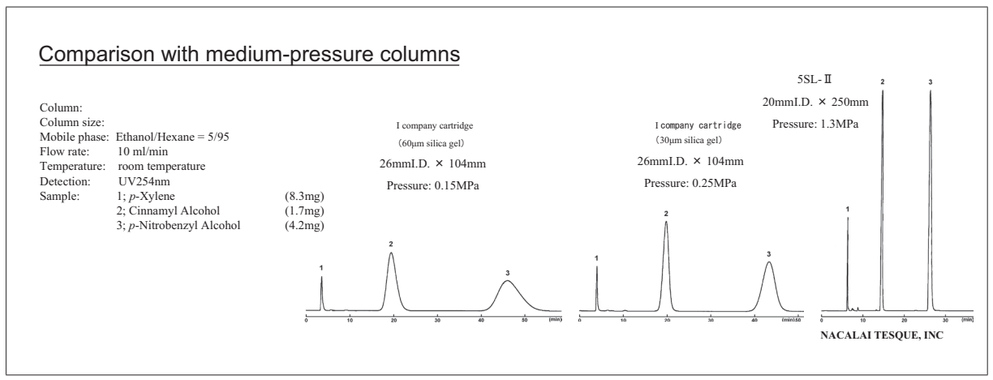
Packing material	SL-II
Silica gel	High purity porous spherical silica
Average particle size	3,5,15 µm
Average pore size	approx. 120 Å
Specific surface area	approx. 300 m^2/g
Feature	◦High purity silica gel (>99.99%) with specially treatment ◦Suitable for preparative separation

Comparison with old type



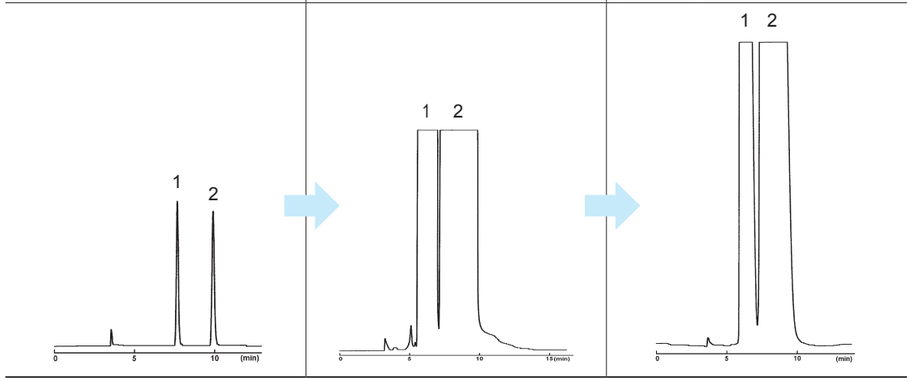
Comparison with medium-pressure column

COSMOSIL SL-II offers sharper peak compared with packing materials for medium-pressure liquid chromatography and open chromatography.



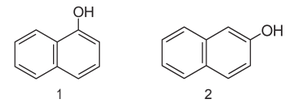
Scaling up from analytical to preparative separation

Step 1	Step 2	Step 3
Mobile phase is optimized by using 4.6 mm I.D. x 250 mm column	Maximum load capacity is optimized by using 4.6 mm I.D. x 250 mm column	Preparative separation by using 20 mm I.D. x 250 mm column
As mobile phase, highly soluble solvent for sample is suitable.	Max. injection volume 56 µl (28 mg)	Max. injection volume 1,050 µl (525 mg) (19 times higher than 4.6 mm I.D.)



Mobile phase Ethyl acetate : Hexane = 10 : 90
Flow rate 4.6 mm I.D. : 1 ml/min
20 mm I.D. : 18.9 ml/min
Temperature Room temperature
Detection UV 254 nm

Sample: 1. 1-Naphthol
2. 2-Naphthol



Please refer to TECHNICAL NOTE 8, Inner diameter of column (scale down and scale up) at page 175

Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL 5SL-II Packed Column

Column size I.D. x length (mm)	Product number
4.6× 50	37999-81
4.6×100	38000-01
4.6×150	38001-91
4.6×250	38002-81
6.0×150	38003-71
6.0×250	38004-61
10×250	38005-51
20×250	38006-41
28×250	34358-61

COSMOSIL 5SL-II Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	37997-01
10×20	37998-91
20×20	05874-91
20×50	05875-81
28×50	34359-51

● Preparative column (Particle size : 15 µm)

COSMOSIL 15SL-II Packed Column

Column size I.D. x length (mm)	Product number
28×250	05893-41
50×250	05895-21
50×500	05896-11

COSMOSIL 15SL-II Guard Column

Column size I.D. x length (mm)	Product number
28×50	05892-51
50×50	05894-31

● Columns of high number of theoretical plates (Particle size : 3 µm)

COSMOSIL 3SL-II Packed Column

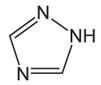
Column size I.D. x length (mm)	Product number
4.6× 10	38059-61
4.6× 50	38060-21
4.6×100	38061-11

7. Hydrophilic interaction chromatography

HILIC

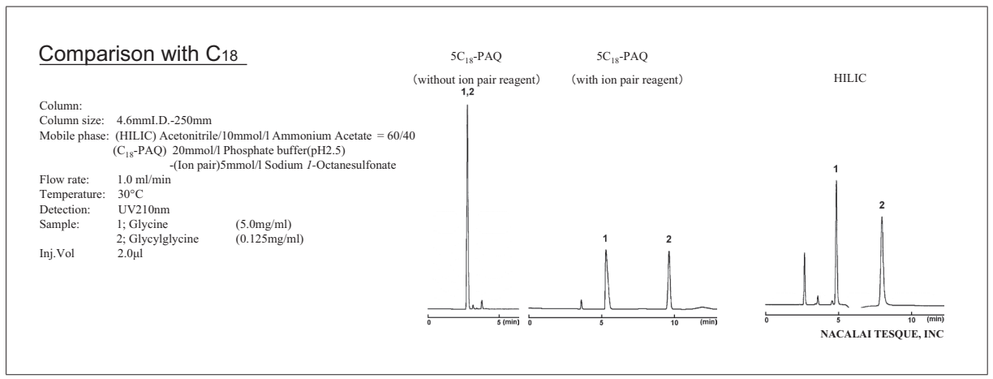
COSMOSIL HILIC is a new column for hydrophilic interaction chromatography with Triazole bonded silica packing material. The hydrophilic interaction chromatography is a variation of normal phase chromatography where a polar stationary phase is used with a mobile phase which contains a high concentration of water miscible organic solvent and a low concentration of aqueous eluent. The main retention mechanism is the partitioning of the polar analytes between the polar stationary and the non-polar mobile phase. As it is also called "aqueous normal phase", the elution order is similar to that of normal phase and the sample elution is in the order of increasing hydrophilicity. Without using ion-pair reagent COSMOSIL HILIC retains highly polar analytes that would not be retained in reversed phase chromatography. It also shows a weak anion-exchange mechanism with the positively charged stationary phase, thus acidic compound is strongly retained.

Material characteristics

Packing material	HILIC
Silica gel	High purity porous spherical silica
Average particle size	5 µm
Average pore size	approx. 120 Å
Specific surface area	approx. 300 m^2/g
Stationary phase	 Triazole
Interactions	Hydrophilic interaction, anion exchange
Object substance	Hydrophilic compounds, acidic compounds
Feature	Suitable for non-retaining by C_{18}

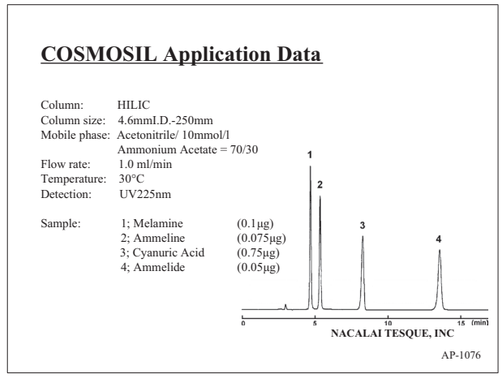
Comparison with C_{18}

COSMOSIL HILIC can separate glycine and glycylglycine without ion-pair reagent. Although C_{18} column can separate them with ion-pair reagents, there are some disadvantages such as column equilibration, preparation of mobile phase and column deterioration.

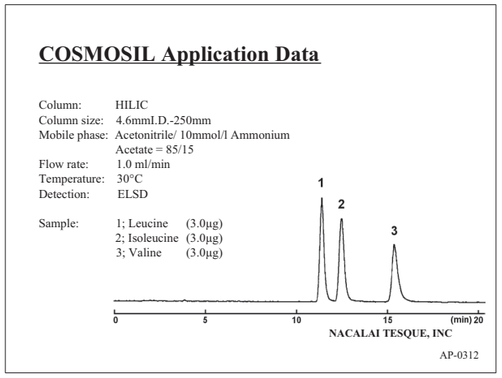


Application data

● Melamine related compounds



● BCAA (amino acid branched-chain)



Optimizing analytical conditions

COMSOSIL HILIC Chromatogram Index, which includes 154 chromatograms using COSMOSIL HILIC, is now available online at http://www.nacalai.co.jp/en/cosmosil/. This index is useful for optimizing analytical conditions for hydrophilic interaction chromatography.

Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL HILIC Packed Column

Column size I.D. x length (mm)	Product number
1.0×150	07869-11
1.0×250	07870-71
2.0× 30	08568-21
2.0× 50	07052-91
2.0×100	08569-11
2.0×150	07054-71
2.0×250	07489-91
3.0×150	07871-61
3.0×250	07872-51

Column size I.D. x length (mm)	Product number
4.6×150	07056-51
4.6×150 3 lots set※	09385-23
4.6×250	07057-41
10×250	07059-21
20×250	07060-81
28×250	07875-21

※ for 4.6×150 3 lots set, please refer to page 11.

COSMOSIL HILIC Guard Column

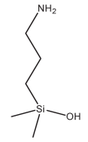
Column size I.D. x length (mm)	Product number
4.6×10	07055-61
10×20	07058-31
20×20	07854-91
20×50	07873-41
28×50	07874-31

8.Saccharide analysis

Introduction

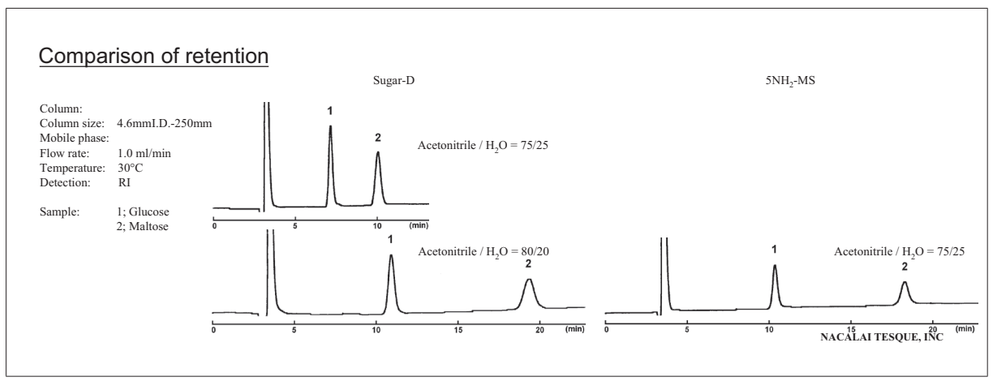
Saccharides are not retained on standard C_{18} columns because of the low hydrophobicity of compounds. COSMOSIL Sugar-D and NH_2-MS are specifically designed for separation of saccharides. COSMOSIL C_{18}-PAQ is recommended for hydrophobic glycosides or saccharide derivatives.

Material characteristics

Packing material	Sugar-D	NH_2-MS
Silica gel	High purity spherical silica	
Average particle size	5 µm	
Average pore size	-	approx. 120 Å
Specific surface area	-	approx. 300 m^2/g
Stationary phase	-	
	Secondary/Tertiary amine	Aminopropyl
Bonding type	-	Polymeric
Object substance	Monosaccharides, oligosaccharides	
End capping treatment	-	Near-perfect treatment
Carbon content	-	approx. 4 %
Feature	◦ First choice of saccharide analysis ◦ High durability ◦ Good quantitative analysis	◦ Different selectivity from Sugar-D

Comparison of retention

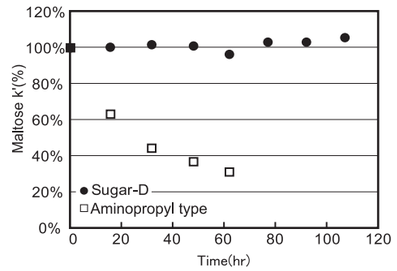
The conventional aminopropyl column is slightly more retentive than Sugar-D. The retention time of Sugar-D can be adjusted by increasing the concentration of acetonitrile in the mobile phase by 5%-10%.



Sugar-D

Conventionally aminopropyl bonded stationary phases are used for liquid chromatographic analysis of mono- and oligosaccharides. General shortcomings of the conventional aminopropyl bonded phases are tailing and adsorption of certain saccharides and the general low durability (short active life) of these columns. These problems are addressed and solved by the novel COSMOSIL Sugar-D, resulting in better (sharper) separation and much improved durability.

Durability

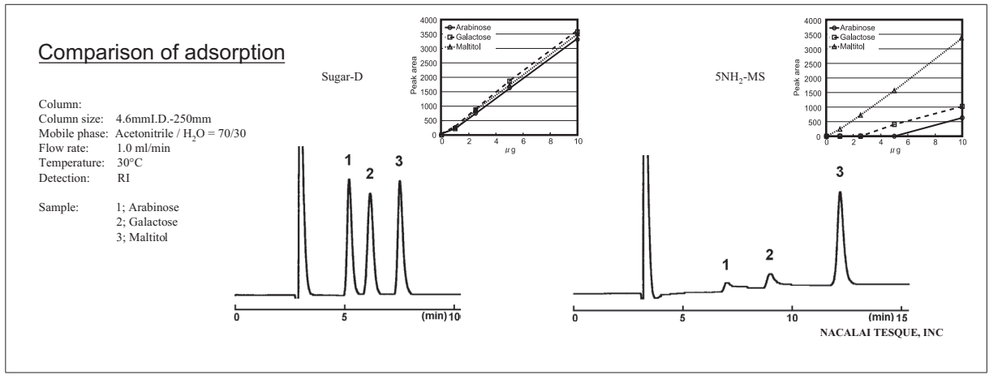


Decomposition condition
Solution Water
Flow rate 1.0 ml/min
Temperature Room temperature

Column 4.6 mm I.D. x 250 mm
Mobile phase Acetonitrile : Water = 70 : 30
Flow rate 1.0 ml/min
Temperature 30°C
Detection RI
Sample Maltose

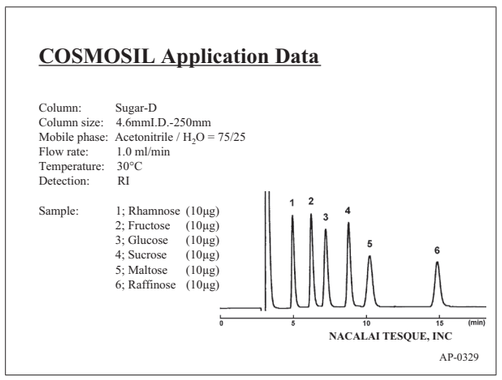
Adsorption characteristics

Certain types of saccharides such as arabinose or galactose are partially or temporarily adsorbed on conventional aminopropyl stationary phases causing tailing or no elution at all. COSMOSIL Sugar-D provides superior separation and high recovery for these saccharides.

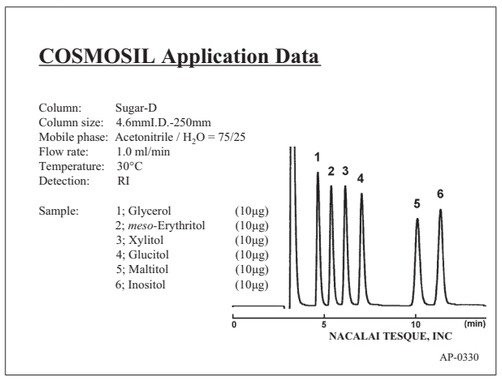


Application data

- Mono- and Oligosaccharides



- Polyols



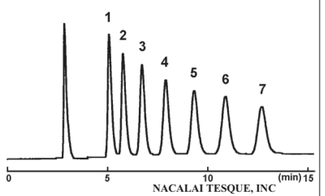
Application data

● Oligomaltoses

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 65/35
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample:
1; Glucose (10µg)
2; Maltose (10µg)
3; Maltotriose (10µg)
4; Maltotetraose (10µg)
5; Maltopentaose (10µg)
6; Maltohexaose (10µg)
7; Maltoheptaose (10µg)



NACALAI TESQUE, INC

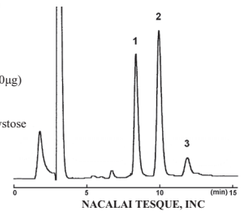
AP-0331

● Oligofructoses

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: Fructooligosaccharides (50µg)
1; *1*-Kestose
2; Nystose
3; *1*-Fructofuranosyl-*D*-nystose



NACALAI TESQUE, INC

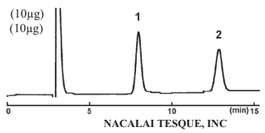
AP-0320

● Acidic sugars

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 20mmol/l Phosphate buffer(pH7) = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; Glucose (10µg)
2; Glucuronic Acid (10µg)



NACALAI TESQUE, INC

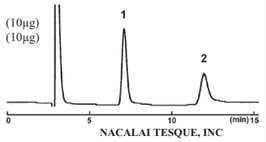
AP-0332

● Amino sugars

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 20mmol/l Phosphate buffer(pH7) = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; Mannose (10µg)
2; Mannosamine (10µg)



NACALAI TESQUE, INC

AP-0333

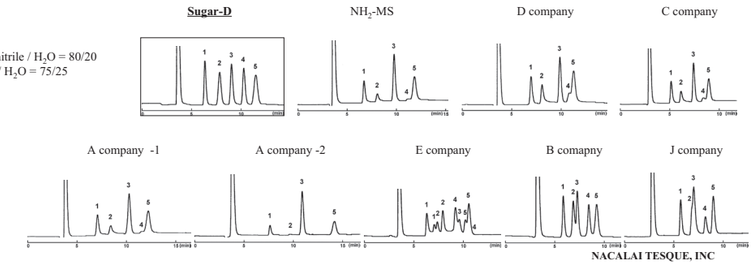
Comparison with other company columns

The separation and the adsorption of monosaccharides were compared using COSMOSIL Sugar-D and other companies' columns. Separation of aldoses, containing aldehyde group per molecule, is usually problematic with undesirable adsorption. COSMOSIL Sugar-D provides excellent separations for these saccharides.

Comparison

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: (Sugar-D, B company) Acetonitrile / H_2O = 80/20
(other) Acetonitrile / H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; Rhamnose (10µg)
2; Xylose (10µg)
3; Fructose (10µg)
4; Mannose (10µg)
5; Glucose (10µg)



NACALAI TESQUE, INC

Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL Sugar-D Packed Column

Column size I.D. x length (mm)	Product number
2.0×250	05689-31
3.0×150	05690-91
3.0×250	05691-81
4.6×150	05395-71
4.6×250	05397-51
10×250	05692-71
20×250	05693-61

COSMOSIL Sugar-D Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	05394-81
10×20	05696-31
20×50	05694-51

NH_2-MS

The COSMOSIL 5NH_2-MS is a column with aminopropyl group bonded silica packing material. It is recommended for separation of monosaccharides and oligosaccharides. While Sugar-D is our first choice for separation of saccharide.

Comparison of adsorption

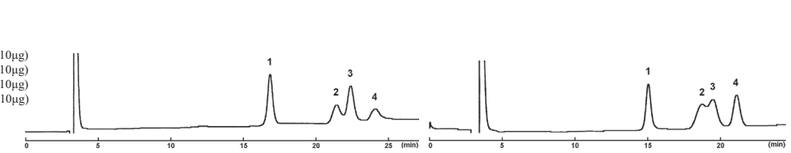
5NH_2-MS can give better separation than Sugar-D in some cases depending on samples

Comparison of separation property

5NH_2-MS Sugar-D

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: (NH_2-MS) Acetonitrile / H_2O = 75/25
(Sugar-D) Acetonitrile / H_2O = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; Sucrose (10µg)
2; Maltose (10µg)
3; Lactose (10µg)
4; Trehalose (10µg)



NACALAI TESQUE, INC

Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL 5NH_2-MS Packed Column

Column size I.D. x length (mm)	Product number
4.6×150	38245-11
4.6×250	38246-01
10×250	38249-71
20×250	38250-31

COSMOSIL 5NH_2-MS Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	38241-51
10×20	38242-41
20×50	06093-91

9. Protein separation wide pore columns

1) Reversed phase chromatography

Protein-R

COSMOSIL Protein-R is a reversed phased HPLC column designed specifically for peptide and protein separations.

Material characteristics

Packing material	Protein-R
Silica gel	High purity spherical porous silica
Average particle size	5 µm
Average pore size	approx. 300 Å
Specific surface area	approx. 150 m^2/g
Stationary phase	Octadecyl group
Bonding type	Polymeric
Main Interactions	Hydrophobic interaction
End capping treatment	Near-perfect treatment
Feature	◦High recovery rate ◦Acid-resistant

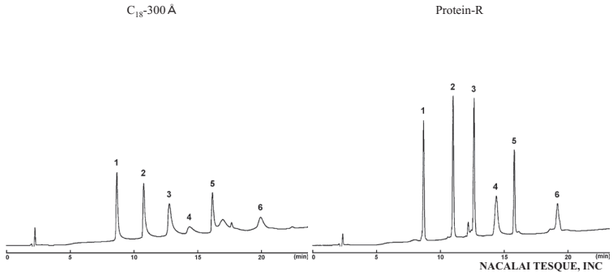
Comparison of separation

Protein-R shows sharper peaks for proteins than conventional C_{18} wide pore columns.

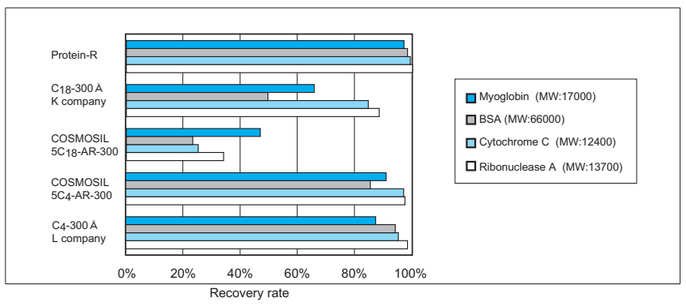
Comparison of separation property

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-20%Acetonitrile
B; 0.05%TFA-60%Acetonitrile
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Ribonuclease A (1.0µg)
2; Cytochrome C (1.0µg)
3; Lysozyme (1.0µg)
4; Albumin (Bovine) (1.0µg)
5; Myoglobin (1.0µg)
6; Ovalbumin (1.0µg)



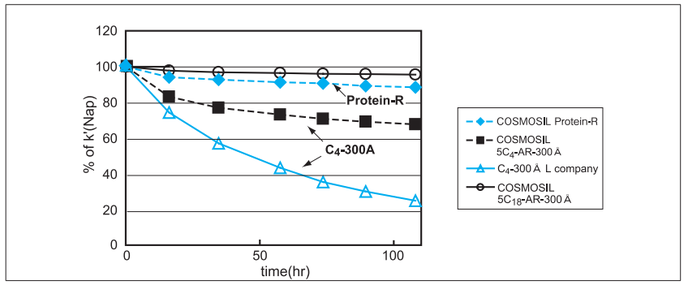
Recovery rate



The figure left shows recovery rates for proteins using different columns. Protein-R shows a higher recovery rate than C_4-300 and a much higher recovery rate than C_{18}-300.

Durability

The figure below shows durability against acidic mobile phase of various columns. Protein-R shows a higher acid durability than C_4-300.



Degradation test with 0.1%-Trifluoroacetic Acid at 60℃
(k'): Napthalene in the mobile phase (Methanol : Water = 50 : 50)

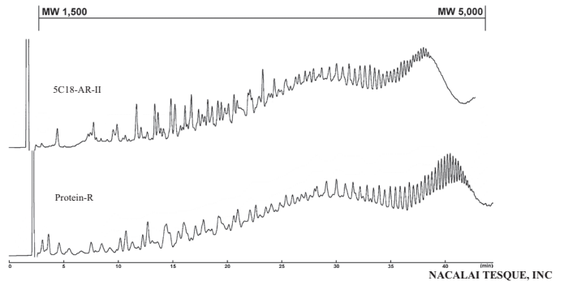
Application of peptide separation

5C_{18}-MS-II (pore size 120 Å) shows better separation of low molecular weight proteins, but Protein-R shows better separation of high-molecular weight proteins.

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-H_2O
B; 0.05%TFA-Acetonitrile
B conc. 0→35% 60min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: Poly-L-Glutamic Acid Sodium Salt
(MW 1500-5000) (200µg)



Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL Protein-R Packed Column

Column size I.D. x length (mm)	Product number	Column size I.D. x length (mm)	Product number
2.0×150	06514-71	10×150	06529-91
4.6× 50	06525-31	10×250	06530-51
4.6×150	06526-21	20×150	06531-41
4.6×250	06527-11	20×250	06532-31

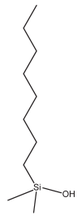
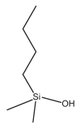
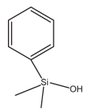
COSMOSIL Protein-R Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	06518-31
10×20	06528-01
20×20	08692-81

C_{18}-AR-300, C_8-AR-300, C_4-AR-300, Ph-AR-300

COSMOSIL offers a variety of stationary phases with wide-pore silica gel material for separations of polypeptides and proteins.

Material characteristics

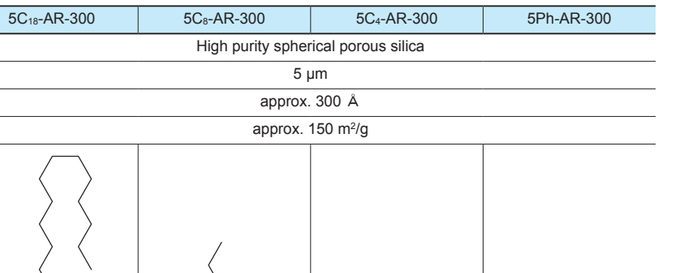
Packing material	5C_{18}-AR-300	5C_8-AR-300	5C_4-AR-300	5Ph-AR-300
Silica gel	High purity spherical porous silica			
Average particle size	5 µm			
Average pore size	approx. 300 Å			
Specific surface area	approx. 150 m^2/g			
Stationary phase				
	Octadecyl group	Octyl group	Butyl group	Phenyl group
Bonding type	Polymeric			
Main Interaction	Hydrophobic interaction			Hydrophobic interaction π-π interaction
End capping treatment	Near-perfect treatment			
Carbon content	approx. 12%	approx. 7%	approx. 6%	approx. 7%

Comparison of separation

Comparison of separation property

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-20%Acetonitrile
B; 0.05%TFA-60%Acetonitrile
B conc. 0→100% 20min Linear grad
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: Hemoglobin, Bovine (10µg)



Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL 5C_{18}-AR-300 Packed Column

Column size I.D. x length (mm)	Product number
4.6× 50	37911-01
4.6×150	37913-81
4.6×250	37914-71

Column size I.D. x length (mm)	Product number
10×150	37917-41
10×250	37918-31
20×150	37919-21
20×250	37920-81

COSMOSIL 5C_{18}-AR-300 Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	37910-11
10×20	37965-11

COSMOSIL 5C_8-AR-300 Packed Column

Column size I.D. x length (mm)	Product number
4.6× 50	37951-81
4.6×150	37953-61
4.6×250	37954-51

Column size I.D. x length (mm)	Product number
10×150	34345-21
10×250	34247-11
20×150	05861-51
20×250	34364-71

COSMOSIL 5C_8-AR-300 Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	37950-91
10×20	34464-61

COSMOSIL 5C_4-AR-300 Packed Column

Column size I.D. x length (mm)	Product number
4.6× 50	37956-31
4.6×150	37958-11
4.6×250	37959-01

Column size I.D. x length (mm)	Product number
10×150	34249-91
10×250	38047-11
20×150	34477-01
20×250	38048-01

COSMOSIL 5C_4-AR-300 Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	37955-41
10×20	05862-41

COSMOSIL 5Ph-AR-300 Packed Column

Column size I.D. x length (mm)	Product number
4.6× 50	37961-51
4.6×150	37963-31
4.6×250	37964-21

Column size I.D. x length (mm)	Product number
10×150	05865-11
10×250	34267-51
20×150	05866-01
20×250	34468-21

COSMOSIL 5Ph-AR-300 Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	37960-61
10×20	34268-41

2) Gel filtration chromatography

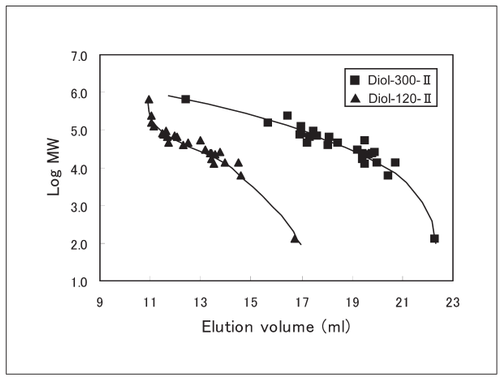
Diol-120-II, Diol-300-II

COSMOSIL Diol-120-II and Diol-300-II gel filtration columns are ideal for the size-based separation of proteins and other water soluble polymers. The separation MW range is 5,000 - 700,000 daltons for proteins and 300 - 300,000 daltons for water soluble polymers when Diol-120-II and Diol-300-II are used in series.

Material characteristics

Packing material	5Diol-120-II	5Diol-300-II
Silica gel	High purity spherical porous silica	
Average particle size	5 µm	
Average pore size	approx. 120 Å	approx. 300 Å
Specific surface area	Diol group	
Object substance	Proteins, water soluble polymers	
Flow rate	0.5-1.0 (ml/min)	
Selection of pore size (Protein)	5,000-100,000 Da	10,000-700,000 Da
Selection of pore size (Water soluble polyme)	300-30,000 Da	500-300,000 Da

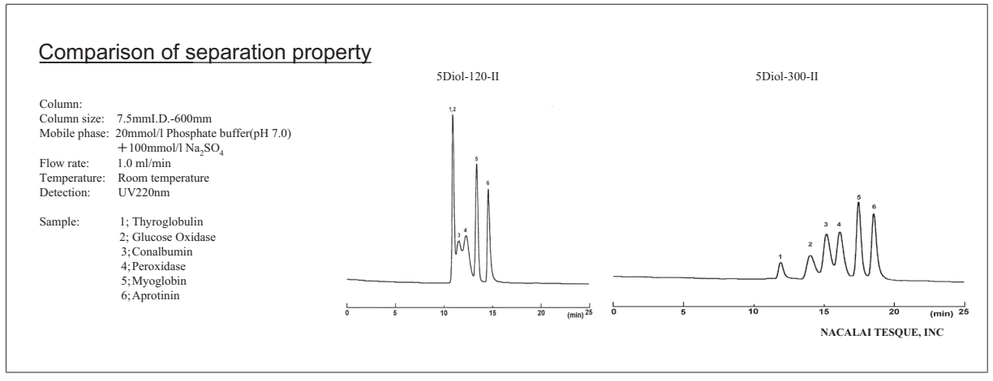
Calibration curve of proteins



Column COSMOSIL 5Diol-II 7.5mmI.D.×600mm
Mobile phase 20mmol/l Phosphate Buffer (pH 7.0) + 100mmol/l Na_2SO_4
Flow rate 1.0ml/min
Temperature 30℃

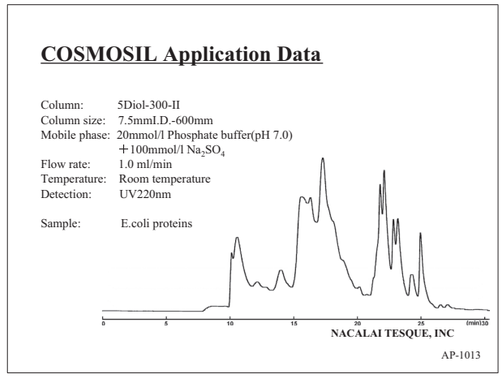
Sample	M.W.	Sample	M.W.
Thyroglobulin	660,000	Peroxidase	40,000
Catalase	250,000	Carbonic Anhydrase	30,000
Glucose Oxidase	160,000	α-Chymotrypsinogen A	25,700
Uricase	128,000	α-Chymotrypsin	25,200
Choline Oxidase	95,000	Trypsinogen	24,000
Transferrin	85,000	Trypsin (bovine)	23,300
Conalbumin	77,500	Myoglobin	17,000
Malate Dehydrogenase	70,000	Lysozyme	14,300
α-Glucosidase	68,500	Ribonuclease A	13,700
Albumin (BSA)	66,000	Cytochrome C	12,400
α-Amylase	52,500	Aprotinin	6,500
Fetuin	48,000	Gly-Gly	132
Albumin (Ovalbumin)	45,000		

Comparison of separation property

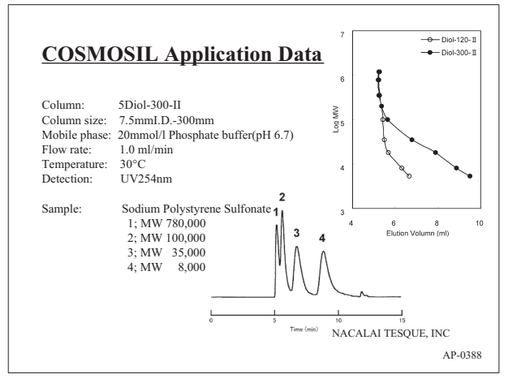


Application data

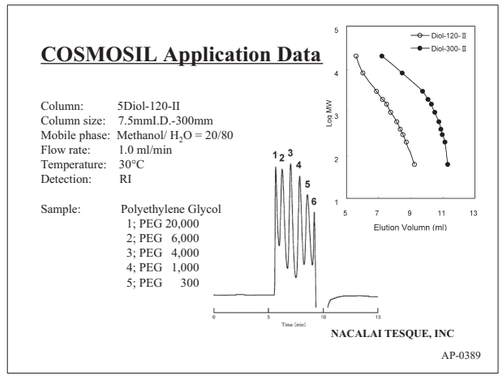
● E.Coli Proteins



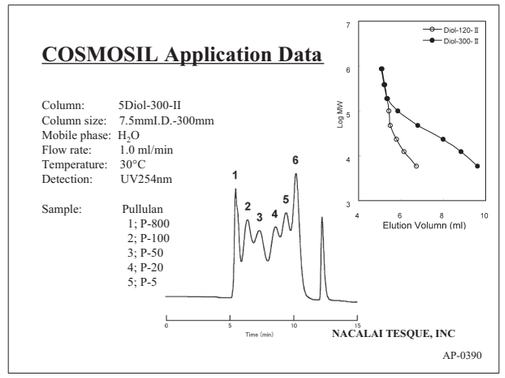
● Water Soluble Polystyrene



● Polyethylene Glycol



● Pullulan



Ordering information

● Analytical column (Particle size: 5 µm)

COSMOSIL 5Diol-120-II Packed Column

Column size I.D. x length (mm)	Product number
7.5×300	38050-51
7.5×600	38051-41

COSMOSIL 5Diol-120-II Guard Column

Column size I.D. x length (mm)	Product number
7.5×50	38049-91

COSMOSIL 5Diol-300-II Packed Column

Column size I.D. x length (mm)	Product number
7.5×300	38053-21
7.5×600	38054-11

COSMOSIL 5Diol-300-II Guard Column

Column size I.D. x length (mm)	Product number
7.5×50	38052-31

3) Ion-exchange chromatography

DEAE, QA, CM, SP

The packing materials for COSMOGEL ion-exchange glass columns are based on hydrophilic polymethacrylate 10 µm particles with a 1000 Å pore size. COSMOGEL packed columns are available with DEAE, a weak anion exchanger; QA, a strong anion exchanger; CM, a weak cation exchanger; and SP, a strong cation exchanger. The availability of four different ion exchangers provides chromatographers with the flexibility of column selection based on charge differences of samples.

Material characteristics

Packing material	DEAE	QA	CM	SP
Type	Diethylaminoethyl type Weak anion exchange	Quaternary ammonium type Strong anion exchange	Carboxymethyl type Weak cation exchange	Sulfopropyl type Strong cation exchange
Gel	Totally porous spherical hydrophilic polymer			
Average particle size	10 µm			
Average pore size	approx.1,000 Å			
Functional group	$N^+H(C_2H_5)_2$	$N^+H(CH_3)_3$	COO^-	SO_3^+
Counter ion	Cl^-	Cl^-	Na^+	Na^+
Capacit y (meq/g)	0.6	0.4	0.3	0.4
50% Ionization pH	10.8	11.0	5.7	2.6
pH range	<11	Whole area	>4	Whole area
Flow rate (appropriate)	7.5 mm I.D. / 8.0 mm I.D ; 0.5 ～1.0 ml/min 20 mm I.D ; 4.0 ～6.0 ml/min			
Flow rate (maximum)	7.5 mm I.D. / 8.0 mm I.D ; 1.5 ml/min 20 mm I.D ; 8.0 ml/min			
Pressure (maximum)	1.5 MPa			
Temperature	10 ～50℃			

Collection rate of proteins

Anion exchange columns

Protein	Collection rate(%)	
	DEAE	QA
Catalase	93	92
BSA	98	97
Ovalbumin	100	103
β-Lactoglobulin	95	102
Myoglobin	97	101
Transferrin	105	102

Sample: 0.02 M Tris-HCl buffer (pH 8.2)
Elution: Tris-HCl buffer (pH 8.2) + 0.5 M NaCl

Cation exchange columns

Pretein	Collection rate(%)	
	CM	SP
γ-Globurin	97	96
α-Chymotrypsinogen	96	103
Myoglobin	99	95
Cytochrome C	98	94

Sample: 0.02 M Tris-HCl buffer (pH 6.5)
Elution: Tris-HCl buffer (pH 6.5) + 0.5 M NaCl

Difference between anion exchange columns and cation exchange columns

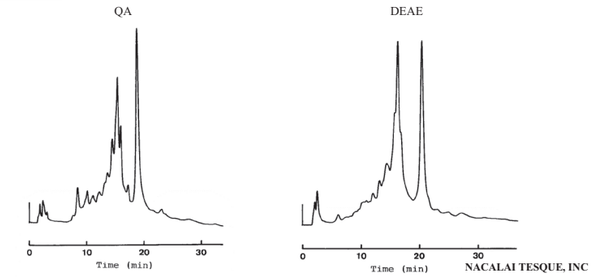
・Separation of proteins on anion exchange columns

The higher the negative charge, the longer the sample is retained on an anion exchange column. As shown below, with a weak alkaline mobile phase, the lower the isoelectric point, the longer the sample is retained.

Separation on anion exchange columns

Column:
Column size: 7.5mmI.D.-75mm
Mobile phase: A:20mmol/l Tris-HCl buffer(pH8.2)
B:0.5mol/l NaCl in buffer A
B conc. 0→100%(30min)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

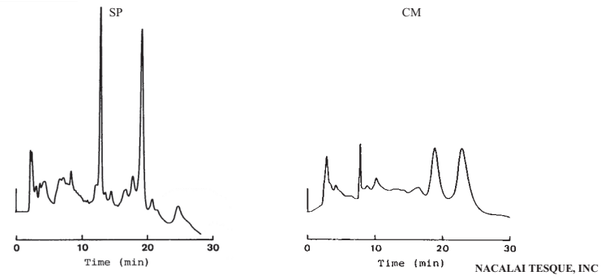
Sample: Lypoxytase(pI 5)



Separation on cation exchange columns

Column:
Column size: 7.5mmI.D.-75mm
Mobile phase: A:20mmol/l Acetate buffer(pH4.5)
B:0.5mol/l Na_2SO_4 in buffer A
B conc. 0→100%(30min)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: Lypoxytase (pI 5)



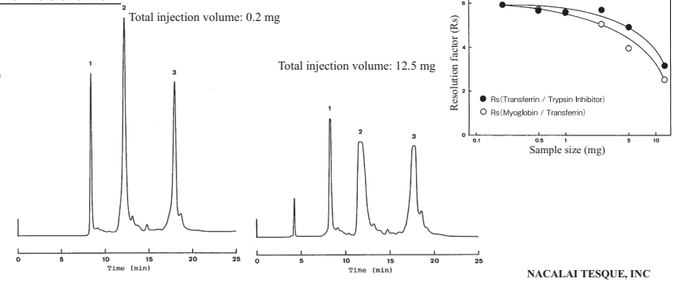
Sample loading capacity and resolution

Up to 1 mg of sample can be well separated on an 8 mm I.D. column.
If the resolution is high enough, 10 mg of sample can be separated.

Sample loading capacity and resolution

Column: DEAE
Column size: 8.0mmI.D.-75mm
Mobile phase: A:20mmol/l Tris-HCl buffer(pH8.2)
B:0.5mol/l NaCl in buffer A
B conc. 0→100%(30min)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm, 0.16AUFS

Sample: 1; Myoglobin (20µg)
2; Transferrin (50µg)
3; Trypsin Inhibitor (70µg)



Selection of the mobile phase

Generally, anion-exchange columns are operated with the mobile phase pH at least one point higher than the isoelectric point (pI) of samples, while cation-exchange columns are operated with the mobile phase pH at least one point lower than the pI. The elution force of bivalent ions such as Bis-tris HCl is stronger than univalent ions such as Tris HCl.

Table. Buffer type and pH

Anion exchange (DEAE, QA)	pH	Cation exchange (CM, SP)
	4.0	Formic acid buffer
Piperazine buffer	5.0	Acetic acid buffer
Bis-Tris buffer	6.5	Phosphoric acid buffer
Tris buffer	8.0	HEPES buffer
Monoethanolamine buffer	9.5	

The initial mobile Phase (A) is 20-50 mmol/l of one of the above mentioned buffer solutions and the final mobile phase (B) is the mobile phase (A) with an addition of 20-600 mmol/l of salt.

Selection of salts

High concentration of salts, generally NaCl, is used in elution buffers. When stronger elution buffer is needed, $CaCl_2$ or $MgCl_2$ can be used for DEAE and QA columns, and Na_2SO_4 can be used for CM and SP columns.

Selection of organic solvents

Water miscible solvents can be used when the elution is not strong enough. COSMOGEL columns can be used with up to 20% of water miscible solvents such as acetonitrile and 2-propanol.

Ordering information

● Analytical column (Particle size: 10 µm)

COSMOGEL Stainless Packed Column

Product name	Column size I.D. x length (mm)	Product number
COSMOGEL DEAE Stainless Packed Column	7.5×75	43371-91
COSMOGEL QA Stainless Packed Column		43373-71
COSMOGEL CM Stainless Packed Column		43375-51
COSMOGEL SP Stainless Packed Column		43377-31

COSMOGEL Glass Packed Column

Product name	Column size I.D. x length (mm)	Product number
COSMOGEL DEAE Glass Packed Column	8.0×75	37845-81
COSMOGEL QA Glass Packed Column		37846-71
COSMOGEL CM Glass Packed Column		37844-91
COSMOGEL SP Glass Packed Column		37847-61

4) Hydrophobic interaction chromatography

HIC

COSMOSIL 5HIC is designed for one step desalting and separation of proteins. Hydrophobic interaction chromatography (HIC) is an effective method for purification and separation of proteins (especially enzymes) based on differences in their surface hydrophobicity. Since this method does not use organic solvents like reversed phase chromatography, there is only a little loss in enzyme activity and the tertiary structure of proteins.

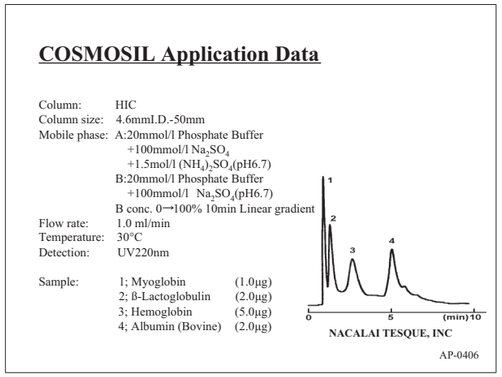
Material characteristics

Packing material	HIC
Silica gel	High purity spherical porous silica
Average particle size	5 µm
Average pore size	approx. 300Å
Specific surface area	approx. 150m^2/g
Main interaction	Hydrophobic interaction

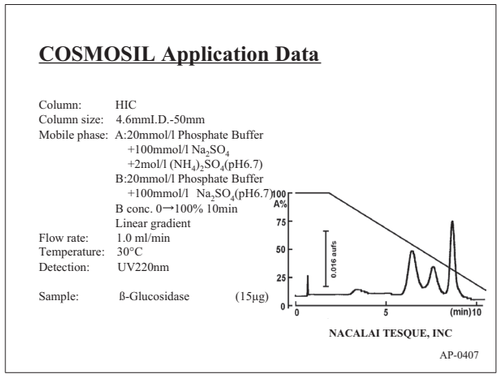
Application data

A buffer with high salt concentration, usually 1-2 mol/l of $(NH_4)_2SO_4$, is used as an initial mobile phase for adsorption of samples to a weakly hydrophobic stationary phase. The elution is done with a decreasing salt gradient.

● Separation of protein standards



● Separation of β-Glucosidase



Ordering information

● Analytical column (Particle size: 5 µm)

COSMOSIL 5HIC Packed Column

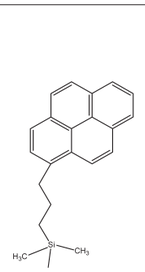
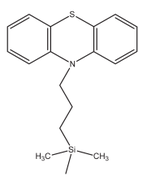
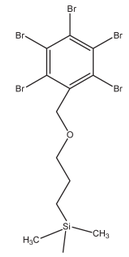
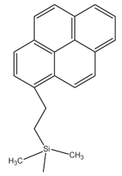
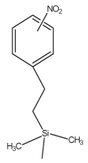
Column size I.D. x length (mm)	Product number
4.6×50	04263-21

10. Special column for fullerenes

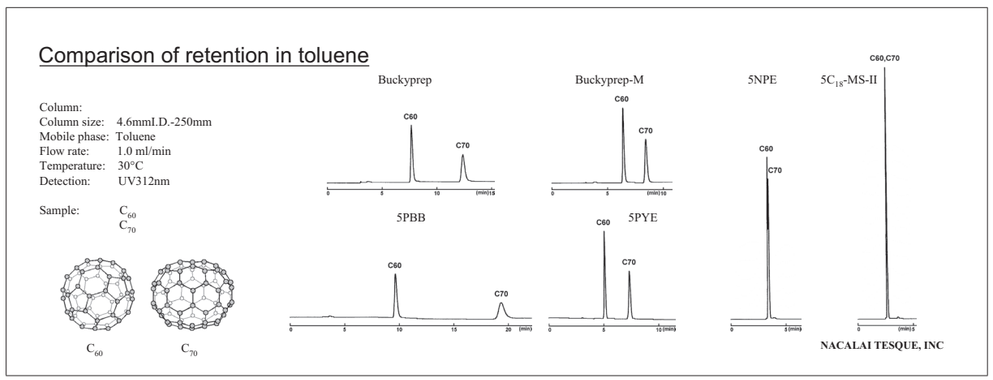
Introduction

Separation of fullerenes, especially preparative-scale separation, on conventional HPLC columns is always problematic due to the low solubility and small recovery of fullerenes. COSMOSIL offers a variety of columns designed for preparative-scale separation of fullerenes including higher fullerenes, metallofullerenes and fullerene derivatives.

Material characteristics

Packing material	Buckyprep	Buckyprep-M	PBB	PYE	NPE
Silica gel	High purity porous spherial silica				
Average particle size	5 µm				
Average pore size	approx. 120Å				
Specific surface area	approx. 300 m^2/g				
Stationary phase					
	Pyrenylpropyl group	Phenothiazinyl group	Pentabromobenzyl group	Pyrenylethyl group	Nitrophenylethyl group
Bonding type	Monomeric				
End capping treatment	Near-perfect	None	Near-perfect treatment		
Carbon content	approx. 17%	approx. 13%	approx. 8%	approx. 18%	approx. 9%
Feature	Standard column for fullerene separation.	Designed to separate metallofullerenes.	Designed for preparative separation of C_{60}, C_{70}.	Separation of fullerene and structural isomers.	Separation of fullerene derivatives

Comparison of retention in toluene

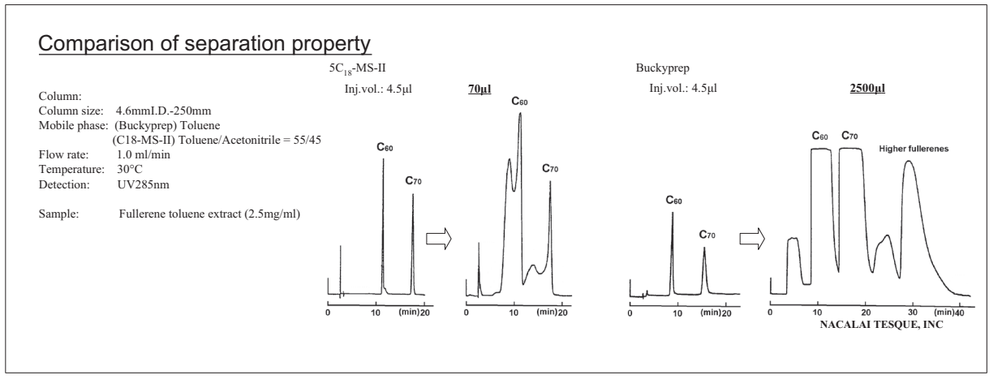


Solubility and boiling point of each solvent for C_{60}

Solubility and boiling point of each solvent for C_{60}

Solvent	mg/ml	b.p.(°C)
Methanol	0.001	64.5
Acetonitrile	0.018	81.8
n−Hexane	0.046	68.7
Toluene	3.2	111
Chlorobenzene*	7.0	132
Carbon disulfide	12	46.3
o−Dichlorobenzene*	27	180
1,2,4−Trichlorobenzene	21.3	213

*: R.S.Ruoff, et al., J.Phy.Chem..97,3379(1993)



Suggested solvents

Solvent	Feature
Chlorobenzene	Stronger eluent than toluene. Recommended for higher fullerenes.
o-Dichlorobenzene	Stronger eluent than chlorobenzene.
1,2,4-Trichlorobenzene	Strongest eluent. It can be used as a washing solvent for higher fullerenes. To wash a column, inject 3 ml of 1,2,4-trichlorobenzene to a 4.6 mm I.D. × 250 mm column and 50 ml to a 20 mm I.D. × 250 mm column after every operation.
n-Hexane	Weak eluent. Recommended for weakly retained fullerenes.
Acetonitrile	Weak eluent. Recommended for weakly retained fullerenes.

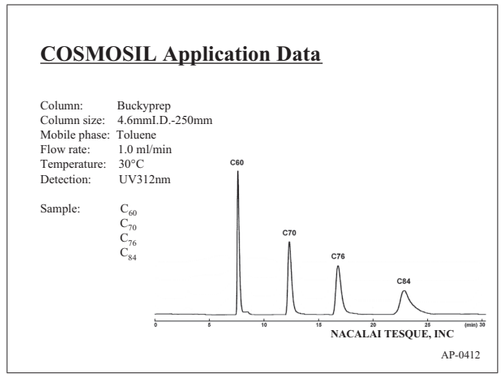
Note : Use them after filtration or distillation, if they are not for HPLC.

Buckyprep

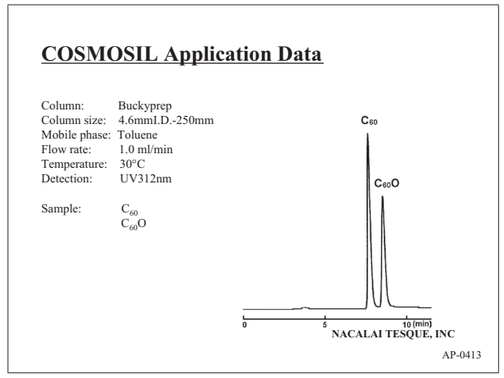
COSMOSIL Buckyprep is a pyrenylpropyl group bonded silica based column specifically designed for fullerene separation. The unparalleled separation capabilities have enabled COSMOSIL Buckyprep to become the world benchmark of HPLC column for fullerene separation. COSMOSIL Buckyprep retains fullerenes very strongly with a mobile phase of 100% toluene and exceeds the injection volume of a standard C_{18} column by a factor of 35. Therefore, preparative-scale separation can be obtained with a 250 mm × 4.6 mm I.D. analytical column.

Application data

● Higher fullerenes

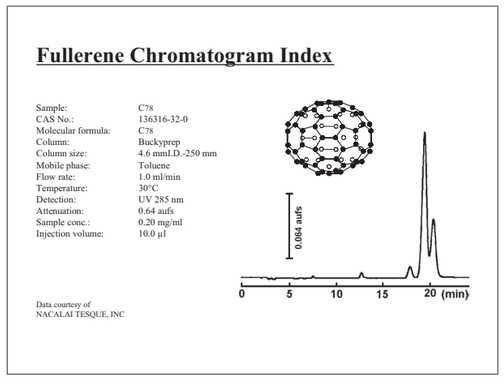


● Detivatized fullerene



Fullerene Chromatogram Index

A comprehensive index with more than 100 chromatograms for fullerene separation is available from Nacalai Tesque, Inc.
Please feel free to contact us for a copy.



Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL Buckyprep Packed Column

Column size I.D. x length (mm)	Product number
4.6×250	37977-61
10×250	37981-91
20×250	37982-81
28×250	34346-11

COSMOSIL Buckyprep Guard Column

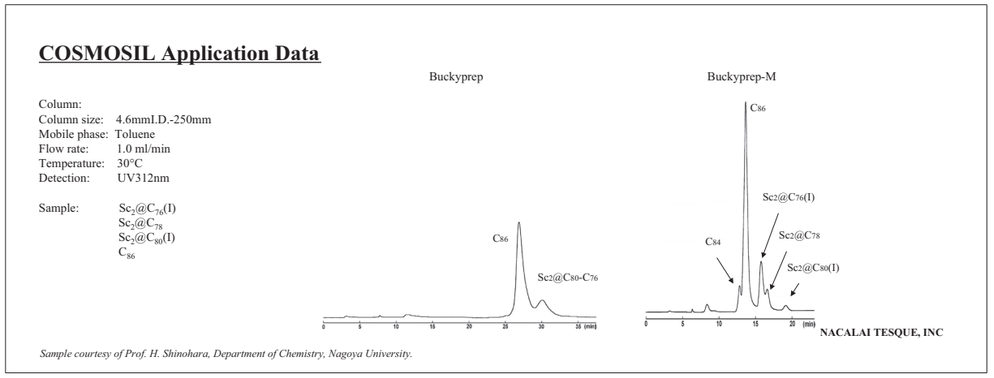
Column size I.D. x length (mm)	Product number
4.6×10	37983-71
10×20	37984-61
20×50	34374-41
28×50	05871-21

Buckyprep-M

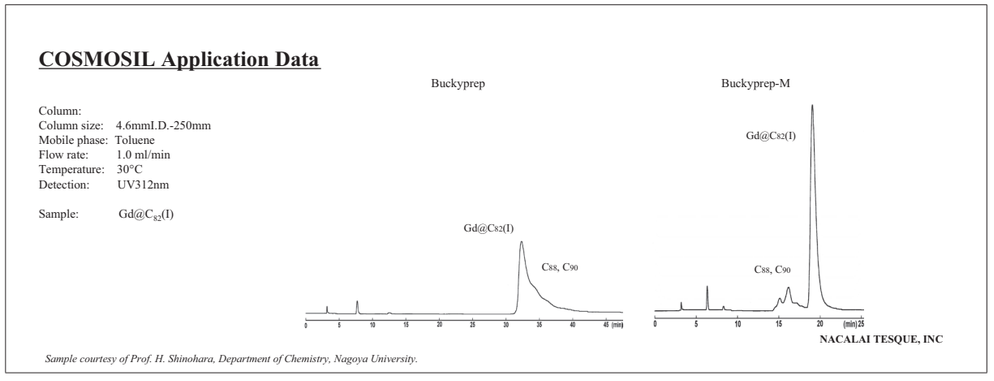
COSMOSIL Buckyprep-M is a phenothiazinyl group bonded silica based column specifically designed for metallofullerene separation. Metallofullerenes are retained more strongly than other fullerenes on this column. COSMOSIL Buckyprep-M is also effective for the separation of higher fullerenes and fullerene derivatives.

Application data

● Metallo fullerenes



Sample courtesy of Prof. H. Shinohara, Department of Chemistry, Nagoya University.



Sample courtesy of Prof. H. Shinohara, Department of Chemistry, Nagoya University.

Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL Buckyprep-M Packed Column

Column size I.D. x length (mm)	Product number
4.6×250	04138-71
10×250	04141-11
20×250	04142-01
28×250	05873-01

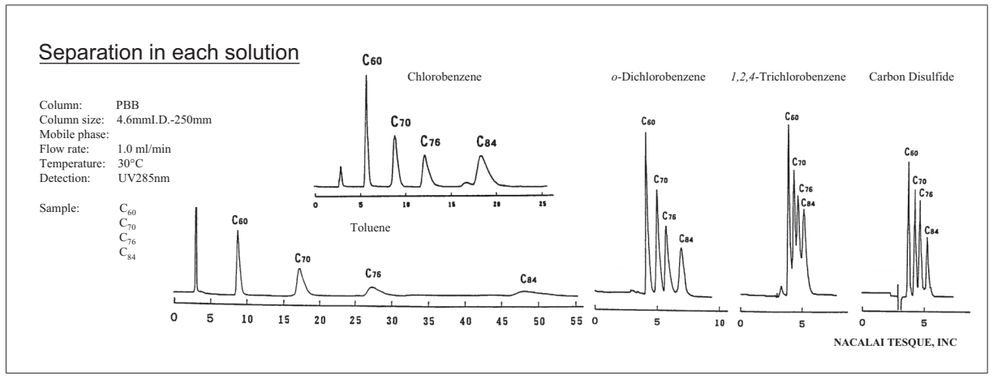
COSMOSIL Buckyprep-M Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	04139-61
10×20	04140-21
20×50	34474-31
28×50	05872-11

PBB

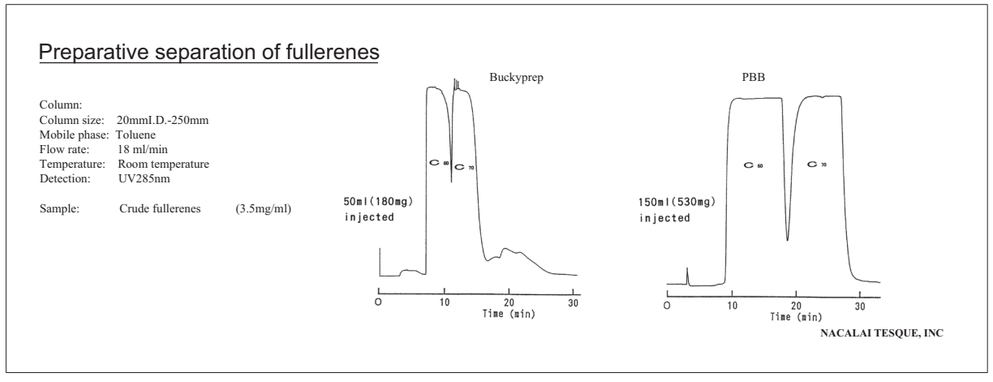
COSMOSIL PBB is a pentabromobenzyl group bonded silica based column useful for preparative-scale separation of fullerenes. It can be used with o-Dichlorobenzene, which has greater solubility for fullerenes than toluene. The loading capacity of COSMOSIL PBB for C_{60} and C_{70} can be three times greater than COSMOSIL Buckyprep.

Separation of fullerenes with different mobile phases



Preparative-scale separation

The loading capacity of COSMOSIL PBB for C_{60} and C_{70} can be three times greater than COSMOSIL Buckyprep.



Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL 5PBB Packed Column

Column size I.D. x length (mm)	Product number
4.6×250	37980-01
10×250	37985-51
20×250	37986-41

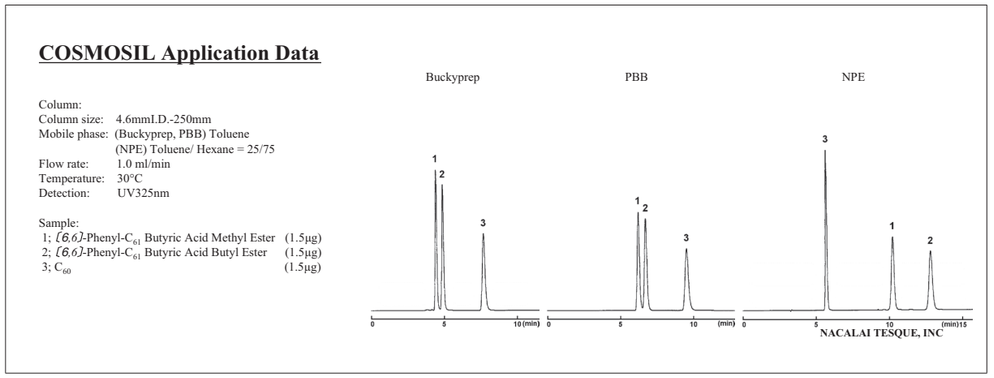
COSMOSIL 5PBB Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	37987-31
10×20	37988-21
20×50	34375-31

PYE • NPE

Application data

● PCBM, PCBB



Ordering information

● Analytical / Preparative column (Particle size: 5 µm)

COSMOSIL 5PYE Packed Column

Column size I.D. x length (mm)	Product number
4.6×250	37989-11
10×250	37996-11
20×250	38044-41
28×250	34300-91

COSMOSIL 5PYE Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	37903-11
10×20	38041-71
20×50	34475-21

COSMOSIL 5NPE Packed Column

Column size I.D. x length (mm)	Product number
4.6×150	37902-21
4.6×250	37990-71
10×250	05469-11
20×250	38046-21

COSMOSIL 5NPE Guard Column

Column size I.D. x length (mm)	Product number
4.6×10	37904-01
10×20	38045-31
20×50	05869-71

11. Special columns for carbon nanotubes

CNT-300, CNT-1000, CNT-2000

COSMOSIL CNT series are ideal for separation of soluble carbon nanotubes based on sizes. COSMOSIL CNT series are packed with hydrophilic group-bonded silica packing material. The columns are specially designed to avoid adsorption of carbon nanotubes to silica support and thus ensure high resolution and maximum recovery of carbon nanatubes. COSMOSIL CNT series are available in three different pore sizes, 300 Å, 1000 Å and 2000 Å, respectively.

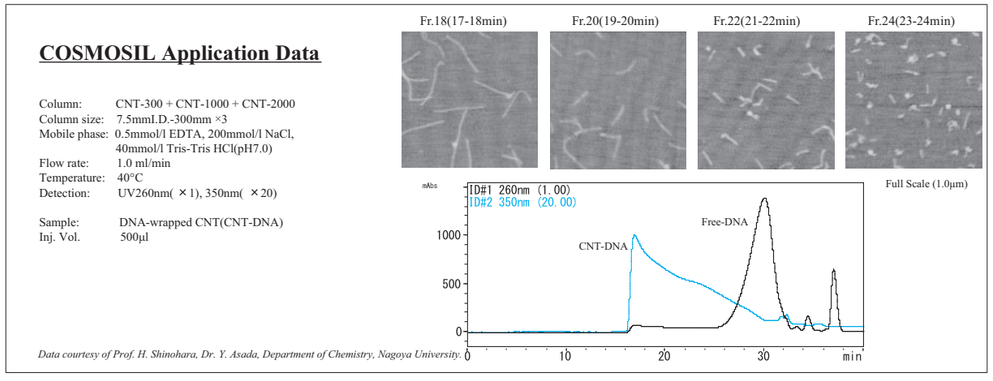
Material characteristics

Packing material	CNT-300	CNT-1000	CNT-2000
Silica gel	High purity porous spherical silica		
Average particle size	5 µm		
Average pore size	approx. 300 Å	approx. 1000 Å	approx. 2000 Å
Stationary phase	Hydrophilic group (neutral)		
pH range	2.0-7.5		
Pressure	15 MPa and below		

Application data

● Carbon nanotubes

COSMOSIL CNT columns offered improved separation for DNA wrapped carbon nanotubes by connecting three columns with different pore sizes.



Ordering information

● Analytical column (Particle size: 5 µm)

COSMOSIL CNT-300 Packed Column

Column size I.D. x length (mm)	Product number
7.5×300	09195-71

COSMOSIL CNT-300 Guard Column

Column size I.D. x length (mm)	Product number
7.5×50	09194-81

COSMOSIL CNT-1000 Packed Column

Column size I.D. x length (mm)	Product number
7.5×300	09197-51

COSMOSIL CNT-1000 Guard Column

Column size I.D. x length (mm)	Product number
7.5×50	09196-61

COSMOSIL CNT-2000 Packed Column

Column size I.D. x length (mm)	Product number
7.5×300	09199-31

COSMOSIL CNT-2000 Guard Column

Column size I.D. x length (mm)	Product number
7.5×50	09198-41

12.Conventional columns versus high performance columns

Introduction

A period of more than 30 years has passed since the first COSMOSIL $5C_{18}$ columns were developed and offered for sale. Continuous technical improvement has made many of these columns obsolete and not of the highest quality and performance available any more. However, many long-term users continue to employ these older conventional columns for routine analysis and quality control. Nevertheless, the manufacture of these older columns will eventually cease and we strongly urge customers to replace the conventional columns with their higher performance equivalents outlined in the table below. For additional information, contact the manufacturer or your local distributor directly.

Conventional columns (old)		High performance columns (new)
$5C_{18}$-AR	→	$5C_{18}$-AR-II
$5C_{18}$	→	$5C_{18}$-MS-II
$5C_{18}$-MS	→	$5C_{18}$-MS-II
$5C_{18}$-P	→	$5C_{18}$-PAQ
$5C_{18}$-P-MS	→	$5C_{18}$-PAQ
$5C_8$	→	$5C_8$-MS
5TMS	→	5TMS-MS
5PE	→	5PE-MS
5CN-R	→	5CN-MS
$5NH_2$	→	$5NH_2$-MS
$5C_{18}$-300	→	$5C_{18}$-AR-300
$5C_8$-300	→	$5C_8$-AR-300
$5C_4$-300	→	$5C_4$-AR-300
5SL	→	5SL-II

Ordering information

Product name	Column size I.D. x length (mm)	Product number
COSMOSIL $5C_{18}$ Packed Column	4.6×150	39047-81
	4.6×250	39265-21
COSMOSIL $5C_{18}$-MS Packed Column	4.6×150	37971-21
	4.6×250	37972-11
COSMOSIL $5C_{18}$-AR Packed Column	4.6×150	37861-61
	4.6×250	37862-51
COSMOSIL $5C_{18}$-P Packed Column	4.6×150	39103-31
	4.6×250	39280-11
COSMOSIL $5C_{18}$-P-MS Packed Column	4.6×150	37995-21
	4.6×250	37994-31
COSMOSIL $5C_8$ Packed Column	4.6×150	39042-31
	4.6×250	39260-71
COSMOSIL 5TMS Packed Column	4.6×150	39057-51
	4.6×250	39275-91
COSMOSIL 5CN-R Packed Column	4.6×150	39114-91
	4.6×250	39285-61
COSMOSIL $5NH_2$ Packed Column	4.6×150	39150-11
	4.6×250	39290-81
COSMOSIL $5C_{18}$-300 Packed Column	4.6×150	39607-41
COSMOSIL 5SL Packed Column	4.6×150	39037-11
	4.6×250	39255-51

For more information on other columns, please feel free to contact us.

II LIQUID CHROMATOGRAPHY RELATED PRODUCT

1. Packing materials for column chromatography

Introduction

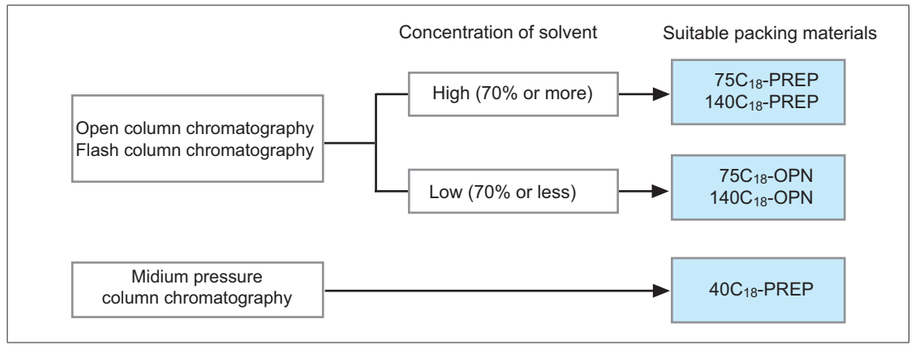
Open column chromatography is an excellent and easy technique for large-scale preparation and purification at low cost. COSMOSIL offers both normal and reversed phase packing materials based on totally porous spherical silica, which provides higher separation, less pressure and higher reproducibility than irregular silica.

Material characteristics

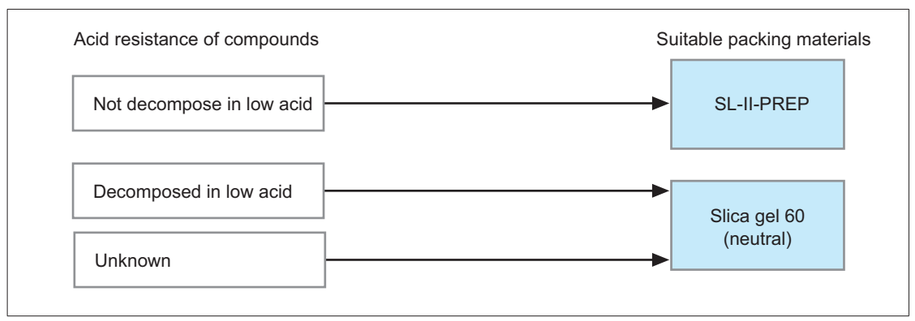
Packing material	C_{18}-OPN	C_{18}-PREP	SL-II-PREP	Silica gel 60(neutral)
Silica gel	High purity porous spherical silica			
Average particle size	75・140 μm	40・75・140 μm	75・140 μm	
Average pore size	approx. 120 Å			approx. 60 Å
Specific surface area	approx. 300 m^2/g			approx. 500 m^2/g
Stationary phase	Octadecyl group		None	
Carbon content	—	approx. 19%	0%	
End-capping treatment	Treated	None	—	
Useful range	Open column chromatography / Flash column chromatography			
	Reversed phase chromatography		Normal phase chromatography	

For more informations on other silica gel, please refer to page 71.

Selection guide (Reversed phase)



Selection guide (Normal phase)



C_{18}-OPN

Conventional reversed phase C_{18} packing materials are restricted to about 30-50% water in the mobile phase. The COSMOSIL C_{18}-OPN is a new “Water-Wet” C_{18} packing material developed for reversed phase open column chromatography. The C_{18}-OPN material can be used in 100% aqueous effluents.

Characteristic

The external surface of the C_{18}-OPN gel is coated with hydrophilic group to increase wettability of the gel, and octadecyl group is bonded in the pore of the gel. This physical characteristic of the gel makes the reversed phase open column chromatography possible with 100 % water.

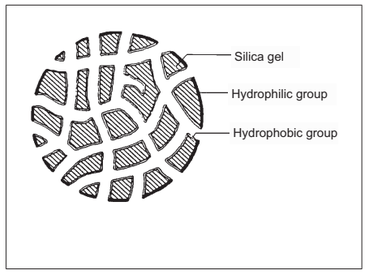


Figure 1. Structure of C_{18}-OPN

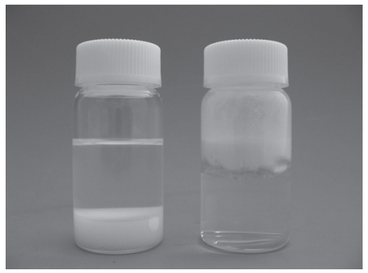


Figure 2. Packing material in water

Left : C_{18}-OPN provides good resolution
Right : C_{18}-PREP float up

Application data

- Separation of Theobromine and Theophylline

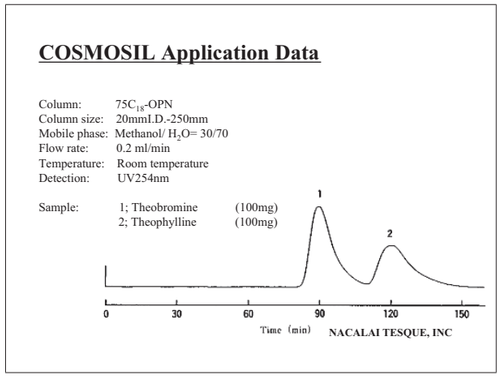


Figure shows the sample are clearly separated by reversed open column chromatography with 70% of water.

Influence of particle size

COSMOSIL Application Data

Column:
Column size: 10mmI.D.-250mm
Mobile phase: Methanol/ H_2O= 20/80
Flow rate: 0.2 ml/min
Temperature: Room temperature
Detection: UV254nm

Sample: 1; Theobromine (TB)
2; Theophylline (TP)
3; Caffeine (CF)

Influence of particle size

Particle (μm)	Flow rate (ml/min)	Theoretical plate number TB	TP	CF	Rs TB/TP	TP/CF	Separation time (min)	Solvent consumption (ml)
75	0.25	400	390	340	1	1.74	240	60
140	0.6	300	280	260	0.9	1.4	100	60

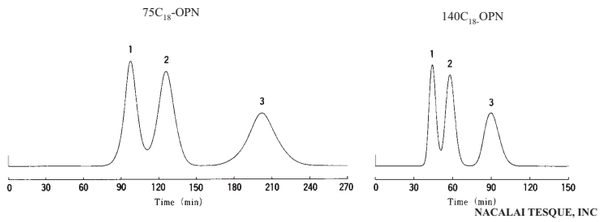
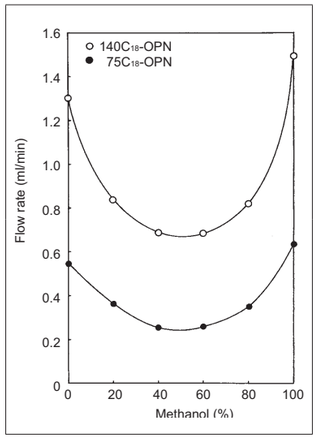


Table. Comparison between 75 μm and 140 μm particle size silica.

Flow rate



Since reversed phase chromatography generally employs high viscosity solvents such as water and methanol, the flow rate is lower than that of normal phase chromatography. The flow rate of reversed phase depends on the mobile phase composition. Figure indicates that the flow rate of the COSMOSIL 140C_{18}-OPN (140 μm in particle size) is about 2.5 times higher than that of the COSMOSIL 75C_{18}-OPN.

Figure. Concentration of methanol against flow rate
Column size: 10 mm I.D. x 180 mm bed height (gravitational liquid flow)

Comparison of normal phase

● Separation of p-Cresol and p-Ethylphenol by normal and reversed phase mode.

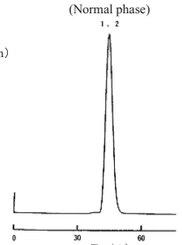
Since the structural difference between p-Cresol and p-Ethylphenol is only one methyene group. it is difficult to separate such samples under normal phase condition. On the other hand, the samples are clearly separated under reversed phase condition with COSMOSIL C_{18}-OPN packing material.

COSMOSIL Application Data

(Normal phase)
Packing media: Silica Gel 120(150 ～ 325mesh)
Column size: 10mmI.D.-180mm
Mobile phase: Hexane/Ethyl Acetate = 90/10
Flow rate: 0.7 ml/min
Temperature: room temperature
Detection: UV254nm

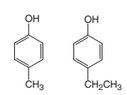
Sample: 1; *p*-Cresol
2;*p*-Ethylphenol

(Normal phase)



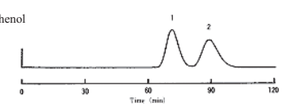
(Reversed phase)
Packing media: 75C_{18}-OPN
Column size: 10mmI.D.-180mm
Mobile phase: Methanol/H_2O = 60/40
Flow rate: 0.2ml/min
Temperature: room temperature
Detection: UV254nm

Sample: 1; *p*-Cresol
2;*p*-Ethylphenol



1: *p*-Cresol 2: *p*-Ethylphenol

(Reversed phase)



NACALAI TESQUE, INC

Column size and required amount of packing material

Table. Column size and required amount of C_{18}-OPN packing material

Column I.D. (mm)	Bed height (mm)	Amount of C_{18}-OPN(g)
10	150	4
	250	7
20	150	17
	250	28
30	150	38
	250	63

Reproducibility and washing methods

Wash the COSMOSIL C_{18}-OPN packing material with tetrahydrofuran, chloroform or other solvents to remove the impurities. This packing material has excellent reproducibility and can be used repeatedly.

"CAUTION"
Do not wash with basic solvents of pH 7 or more which will dissolve the silica gel or pH 2 or less which will cleave the C_{18} stationary phase. Dry the packing material at 50°C or less. See end of this chapter for packing method.

Ordering information

● COSMOSIL C_{18}-OPN

Product name	Average particle size	Product number	PKG size
COSMOSIL 75C_{18}-OPN	75 μm	37842-66	100 g
		37842-95	500 g
		37842-11	1 kg
COSMOSIL 140C_{18}-OPN	140 μm	37878-16	100 g
		37878-45	500 g
		37878-61	1 kg

C_{18}-PREP

The large particle size C_{18} bulk materials are widely used for lab to process scale purifications. COSMOSIL offers three different particle sizes of C_{18} packing materials.

Particle size, flow rate and theoretical plate number

Because reversed phase chromatography employs effluents of high viscosity such as methanol and water, the flow rate is lower than that of normal phase chromatography, which uses effluents of low viscosity such as hexane and ethyl acetate.

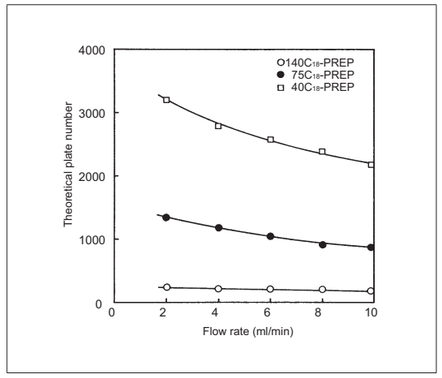


Figure 1. Flow rate against theoretical plate number
Column size: 20 mm I.D. x 300 mm

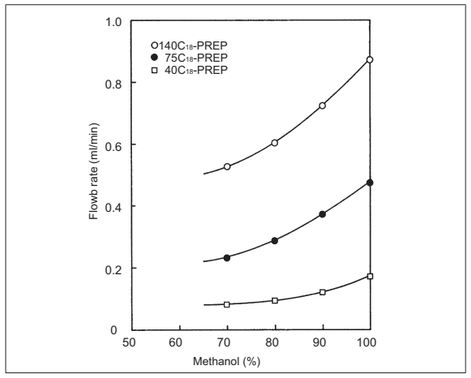
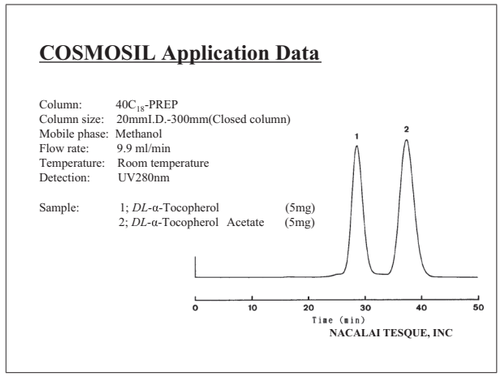


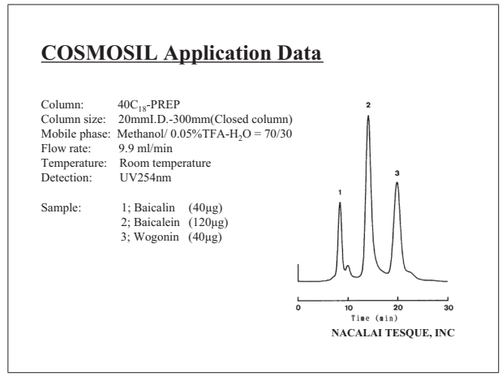
Figure 2. Concentration of methanol against flow rate
Column size: 10 mm I.D. x 180 mm bed height (gravitational liquid flow)

Application data

● Vitamin E



● Natural compounds



Ordering information

● COSMOSIL C_{18}-PREP

Product name	Average particle size	Product number	PKG size
COSMOSIL 40C_{18}-PREP	40 μm	37932-86	100 g
		37932-15	500 g
		37932-31	1 kg
COSMOSIL 75C_{18}-PREP	75 μm	37933-76	100 g
		37933-05	500 g
		37933-21	1 kg
COSMOSIL 140C_{18}-PREP	140 μm	37934-66	100 g
		37934-95	500 g
		37934-11	1 kg

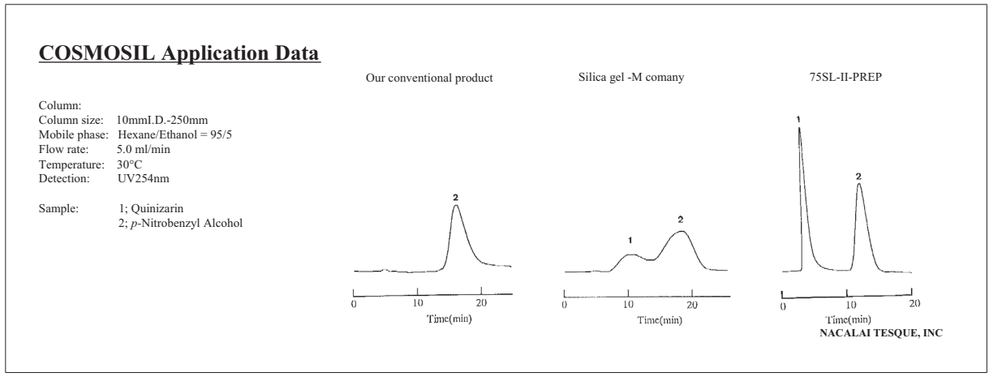
SL-II-PREP

COSMOSIL SL-II-PREP is ultra pure silica gel packing material more than 99.99% purity. COSMOSIL SL-II-PREP provides improved separation and reproducibility for compounds with carbonyl or phenol hydroxyl groups, which are often problematic on conventional silica gel materials.
*All chromatograms shown below are obtained with silica gel packed into stainless steel columns.

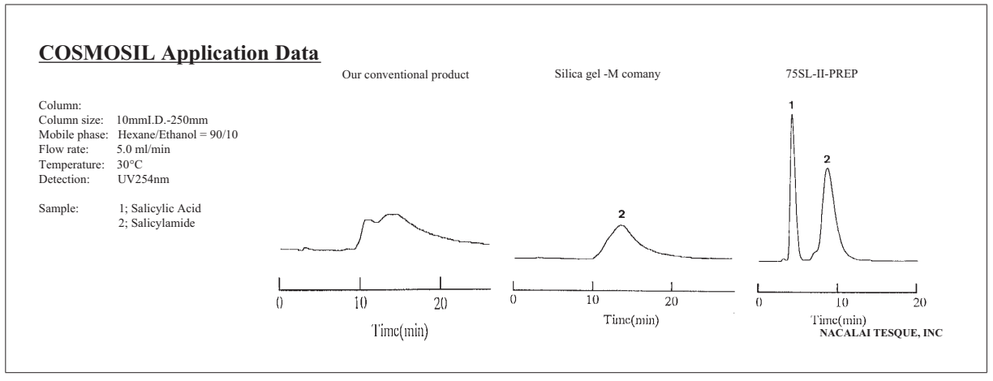
Performance for chelating compounds

Highly purified silica gel of COSMOSIL SL-II-PREP enables separation of metal coordination compounds without adsorption.

● Metal Coordination Compounds



● Organic Acid and Amide



Ordering information

● COSMOSIL SL-II

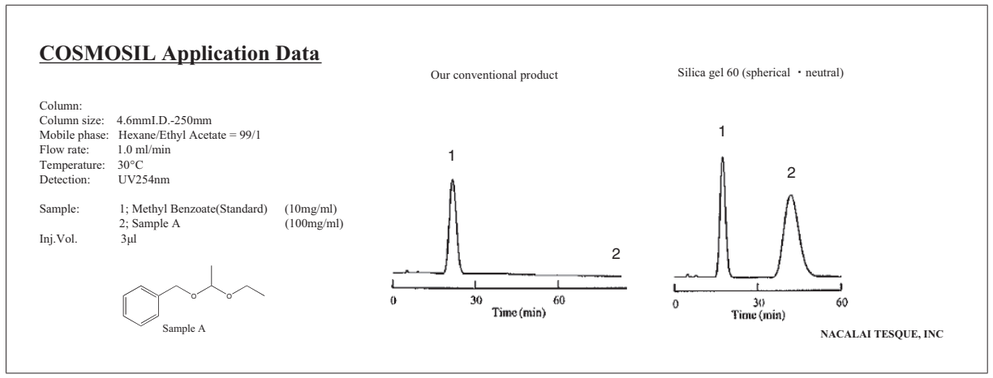
Product name	Average particle size	Product number	PKG size
COSMOSIL 75SL-II-PREP	75 μm	38012-64	100 g
		38012-35	500 g
		38012-51	1 kg
COSMOSIL 140SL-II-PREP	140 μm	38013-54	100 g
		38013-25	500 g
		38013-41	1 kg

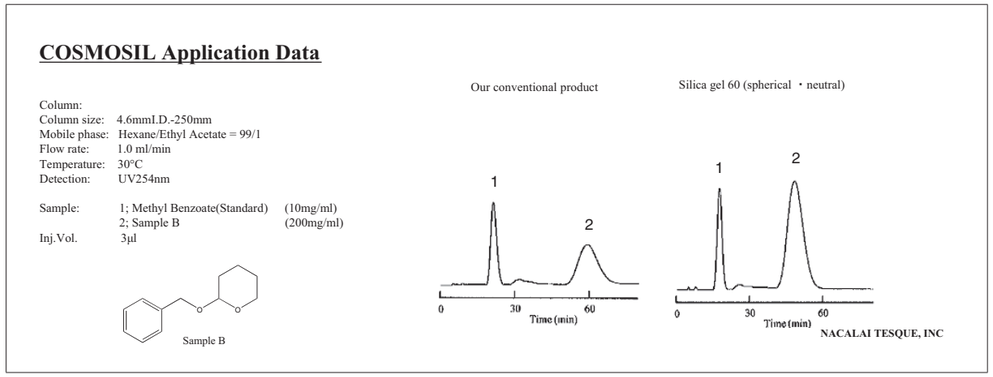
Silica gel (spherical・neutral)

Since conventional silica gels are weakly acidic, some pH sensitive compounds may be decomposed during the purification by column chromatography with the acidic silica gels. The pH of Silica gel 60 (spherical・neutral) is adjusted to nearly neutral for the separation of not only pH sensitive compounds but also new compounds that the physical properties are still unknown.
*All chromatograms shown below are obtained with silica gel packed into stainless and steel columns.

Comparison with conventional silica gel

● Purification of Acetal





Ordering information

● Silica gel (spherical・neutral)

Product name	Average particle size	Product number	PKG size
Silica gel 60 (spherical・neutral) for column chromatograph	75 µm	30511-64	100 g
		30511-35	500 g
		30511-51	1 kg
		30511-06	5 kg
		30511-22	25 kg
	140 µm	30518-94	100 g
		30518-65	500 g
		30518-81	1 kg
		30518-52	25 kg

Silica gel (for column chromatograph)

Ordering information

● Silica gel (spherical)

Product name	Particle size	Pore size	Grade	Product number	PKG size
Silica Gel 60, spherical	approx. 70 ~ 230 mesh	60 Å	SP	30731-71	1 kg
				30731-42	25 kg
	approx. 150 ~ 325 mesh		SP	30733-51	1 kg
				30733-22	25 kg
Silica Gel 120, spherical	approx. 70 ~ 230 mesh	120 Å	SP	30734-41	1 kg
	approx. 150 ~ 325 mesh			30735-31	1 kg

● Silica gel (irregular)

Product name	Particle size	Pore size	Grade	Product number	PKG size
Silica Gel 60	approx. 70 ~ 230 mesh	60 Å	SP	30724-55	500 g
				30724-71	1 kg
				30724-84	5 kg
				30724-42	25 kg
	approx. 230 ~ 400 mesh		SP	30721-85	500 g
				30721-01	1 kg
				30721-14	5 kg
				30721-72	25 kg

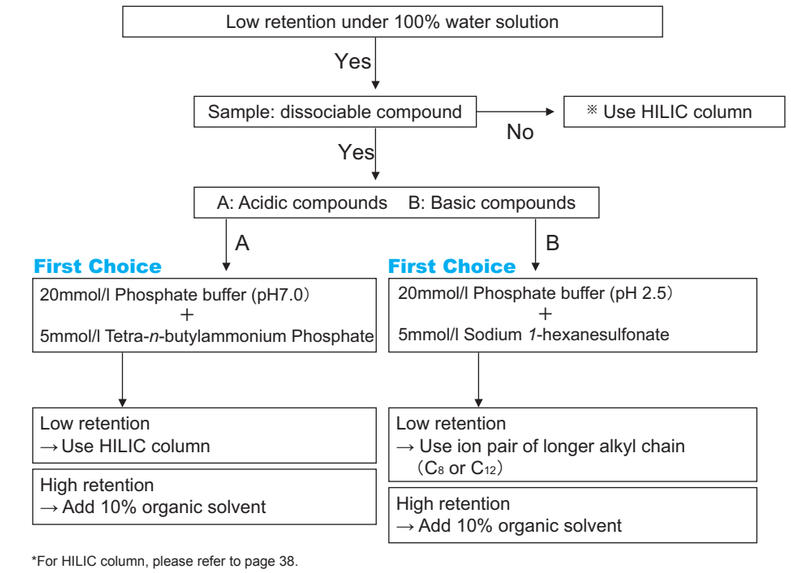
2. Liquid chromatography related products (for mobile phase)

Ion-pair reagents

The use of ion pair reagents as mobile phase additives extends the applicability of reversed phase HPLC. Ionic or highly polar compounds are difficult to analyze by reversed phase using only organic solvent and buffer solution because of the short retention time. Ion pair reagents are strong hydrophobic ions which form neutral ion pairs with oppositely charged samples molecules, making the efficient ODS columns amenable to separate ionic or highly polar samples. Nacalai Tesque offers a broad range of ion pair reagents for pharmaceutical compounds and other highly polar materials.

General use of ion-pair reagents in the mobile phase

When using ion pair reagents, ample time should be allowed for establishing equilibrium and for cleaning the column.
When using ion pair reagents with an alkyl chain of C_{10} or shorter, it typically takes 20 minutes for establishing equilibrium and 30 minutes for cleaning. It may take more than 1 hour to clean the column when using ion pair reagents with an alkyl chain longer than C_{10}. Therefore, it is highly recommended to prepare a column for exclusive use with ion pair reagents.

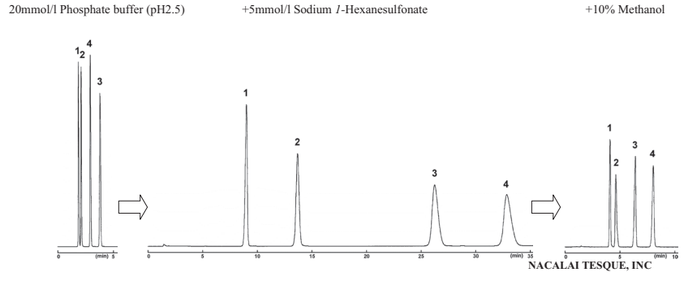


*For HILIC column, please refer to page 38.

Separation adjustment

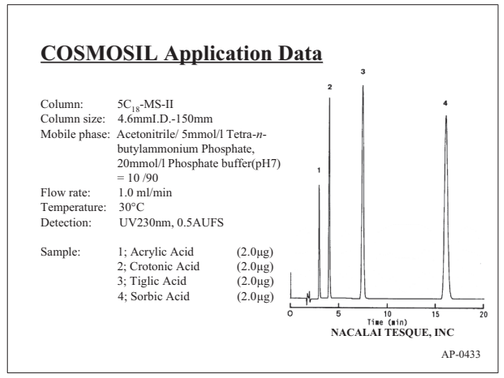
Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase:
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV270nm

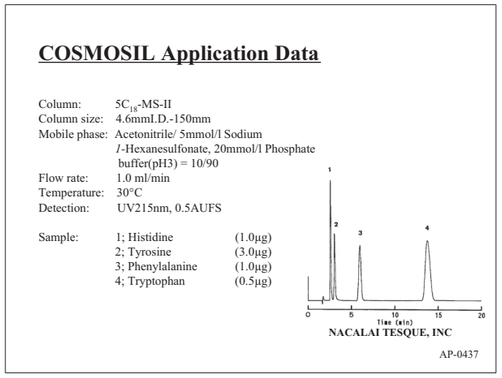
Sample: 1; *L*-Noradrenaline
2; *L*-Adrenaline
3; *L*-DOPA
4; Dopamine Hydrochloride



Application data

● Low-molecular-weight unsaturated carboxylic acids ● Amino acids





Ordering information

● for Basic samples (R-SO_3^- Na^+)

Product name	R:	Grade	Product number	PKG size
Sodium 1 - Butanesulfonate	C_4H_9-	SP	31331-94	5 g
Sodium 1 - Pentanesulfonate	C_5H_{11}-	SP	31730-64	5 g
			31730-22	25 g
Sodium 1 - Hexanesulfonate	C_6H_{13}-	SP	31529-24	5 g
			31529-82	25 g
Sodium 1 - Heptanesulfonate	C_7H_{15}-	SP	31528-34	5 g
			31528-92	25 g
Sodium 1 - Octanesulfonate	C_8H_{17}-	SP	31729-04	5 g
			31729-62	25 g
Sodium 1 - Nonanesulfonate	C_9H_{19}-	SP	31626-44	5 g
Sodium 1 - Decanesulfonate	$C_{10}H_{21}$-	SP	31429-34	5 g
Sodium 1 - Undecanesulfonate	$C_{11}H_{23}$-	SP	32030-04	5 g
Sodium 1 - Dodecanesulfonate	$C_{12}H_{25}$-	SP	31426-64	5 g
Sodium Lauryl Sulfate	**	SP	31623-32	25 g
0.5M Solution				
Sodium 1 - Butanesulfonate	C_4H_9-	SP	31332-84	5×10 ml
Sodium 1 - Hexanesulfonate	C_6H_{13}-	SP	31532-64	10 ml
			31532-06	5×10 ml
Sodium 1 - Octanesulfonate	C_8H_{17}-	SP	31733-34	10 ml
			31733-76	5×10 ml

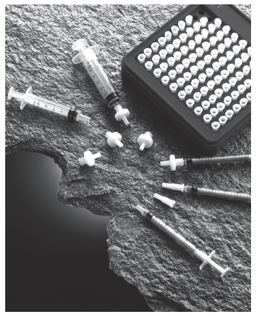
● for Acid samples $(C_4H_9)_4N^+$ X^-

Product name	X-:	Grade	Product number	PKG size
Tetra - n - butylammonium Bromide	-Br	SP	32824-72	25 g
Tetra - n - butylammonium Chloride	-Cl	EP	32935-51	1 g
			32935-64	5 g
			32935-22	25 g
Tetra - n - butylammonium Hydrogensulfate	-HSO_4	GR	32924-62	25 g
Tetra - n - butylammonium Iodide	-I	SP	32905-54	5 g
			32905-12	25 g
Tetra - n - butylammonium Perchlorate	-ClO_4	SP	32906-44	5 g
			32906-02	25 g
Tetra - n - butylammonium Phosphate	-H_2PO_4	SP	32929-54	5 g
0.5M Solution				
Tetra - n - butylammonium Phosphate	-H_2PO_4	SP	32926-26	10 ml
			32926-84	5×10 ml

3. Liquid chromatography related prodcuts (for pretreatment)

Cosmonice filter

Injection of samples containing particulates (microparticles, precipitates, colloid substances) will clog HPLC columns, shorten injector life, and result in extensive maintenance on pumps. Cosmonice filters are used to remove particulates from samples and prolong the life of HPLC system components. There are two types of Cosmonice filters as stated below.



W series (Aqueous solution)

W series are installed with low adsorption hydrophilic durapore filter (polyvinylidenedifluoride, PVDF). W series can be used with both aqueous and organic solvents. They are best suited for prefiltration of protein and other biological samples.

S series (Organic solvents)

S series are installed Teflon filter (polytetrafluoroethylene, PTFE) with strong resistance to organic solvents, acids and alkalis. They are best suited for prefiltration of samples with aggressive organic solvents such as chloroform and tetrahydrofuran.

Please refer to TECHNICAL NOTE 3, Sample pretreatment for HPLC at page 164.

Ordering information

● Cosmonice filter

Product name	Diameter (mm)	Pore size (μm)	Process volume	Hold-up volume	Product number	PKG size
Cosmonice Filter W (Aqueous)	4	0.45	less than 1 ml	＜10 μl	06543-04	100 pkg
	13	0.45	0.5 - 10 ml	＜30 μl	06544-94	100 pkg
	25	0.45	3 - 50 ml	＜100 μl	06545-84	50 pkg
Cosmonice Filter S (Solvent)	4	0.45	less than 1 ml	＜10 μl	06541-24	100 pkg
	13	0.45	0.5 - 10 ml	＜30 μl	06542-14	100 pkg

[Connection] Inlet: luer-lock, Outlet: luer-slip, Connectable needles

Cosmospin fileter

Cosmospin filters are used to remove fine particles and precipitates from samples by centrifugation. They utilize omnipore hydrophilic PTFE membrane filter, which has a wide range of chemical resistance. Cosmospin filters are the best choice for HPLC sample filtration. Two pore sizes, G (0.2 μm) and H (0.45 μm), are available.

Please refer to TECHNICAL NOTE 3, Sample pretreatment for HPLC at page 164.

Ordering information

● Cosmospin filter

Product name	Pore size (μm)	Maximum sample volume	Hold-up volume	Maximum centrifugal force	Rotor size (fixed-angle)	Filtration ara	Color	Product number	PKG size
Cosmospin Filter G	0.2	0.4 ml	5 μl	5,000× g	1.5 ml	0.2 cm^2	brown	06549-44	100 pkg
Cosmospin Filter H	0.45	0.4 ml	5 μl	5,000× g	1.5 ml	0.2 cm^2	white	06540-34	100 pkg

Dimention: Diameter 10.6 mm x Length 45 mm Membrane: Omnipore Hydrophilic PTFE Sample reservoir and collection tube: Polypropylene

Chemical compatibility

Solvent	Cosmonice W series	Cosmonice S series	Cosmospin	Solvent	Cosmonice W series	Cosmonice S series	Cosmospin
Acetic acid, 98%	+	+	+	Hydrogen gas	+	+	+
Acetone	-	+	+	Hydrogen peroxide (3%)	+	+	
Acetonitrile	+	+	+	Hydraulic oil (5606)	+	+	+
Ammonia solution (6N)	+	+	+	Hypo (photo)	+	+	+
Ammounium hydroxide (conc.)	+	+	-	Isopropyl acetate	+	+	+
Amyl alcohol	+	+	+	Isopropyl alcohol	+	+	+
Benzene	+	+	-	Kerosene	+	+	+
Benzyl alcohol	+	+	-	Methanol	+	+	+
Boric acid	+		+	Methyl ethyl ketone	-	+	+
Butyl acetate		+		Methyl isobutyl ketone	+	+	-
Carbon tetrachloride	+	+	+	2-Methyl-1-propanol	+	+	+
Chloroform	+	+	+	Nitric acid (6N)	+	+	
Cyclohexanone	-	+	-	Nitrobenzene	+	+	-
Dichloromethane	+	+	-	Ozone gas	-	+	-
Dimethylacetamide	-	+	+	Paraldehyde		+	
Dimethylformamide	+	+	+	Pentane	+	+	-
Dimethylsulfoxide	-	+	-	Petroleum ether	+	+	
Dioxane	+	+	+	Phenol (water saturation)	+	+	-
DMSO	-	+	-	Phosphate buffer solution	+		+
Ethers	+	+	+	2-Propanol	+	+	+
Ethyl acetate	+	+	+	Pyridine	-	+	+
Ethyl alcohol	+	+	+	Seawater	+	+	+
Ethyl cello solve	+	+	+	Silicone oils	+	+	+
Ethylene glycol	+	+	+	Sodium hydroxide (conc.)	+	+	+
Formamide	+	+	+	Sulfuric acid (6N)		+	
Freon, TF or PCA solvent	+	+	+	Toluene	+	+	-
Gasoline	+	+	+	THF	-	+	-
Glycerine (Glycerol)	+	+	+	Trichloroacetic acid	+	+	+
Helium gas		+	+	Trichloroethane	+	+	-
Hexane	+	+	-	Trichloroethylene	+	+	-
Hydrochloride (6N)	+	+	+	TFA	+	+	-
Hydrofluoric acid	-	+	-	Xylene	+	+	+

+ : Recommended, - : Not recomended, (blank) : Not data available

COSMOSIL HPLC accessories

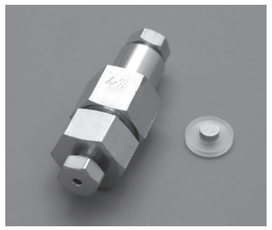
Ordering information

COSMOSIL Guard Cartridge Holder

Product name	Product number	PKG size
COSMOSIL Guard Cartridge Holder	38009-79	1 PKG

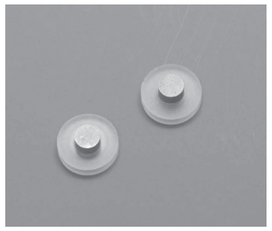
COSMOSIL Column Prefilter

Product name	Product number	PKG size
COSMOSIL Column Prefilter	39361-19	1 PKG



COSMOSIL Column Spare Filter for Prefilter

Product name	Product number	PKG size
COSMOSIL Column Spare Filter for Prefilter	39539-09	2 PKG



COSMOSIL Column Connecting Tube

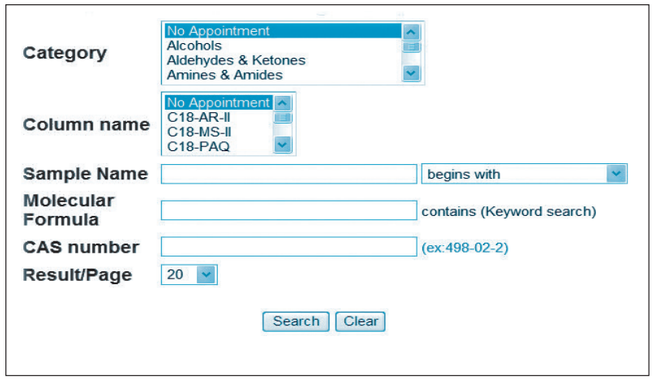
Product name	Product number	PKG size
COSMOSIL Column Connecting Tube	37843-69	1 PKG

III APPLICATION DATA

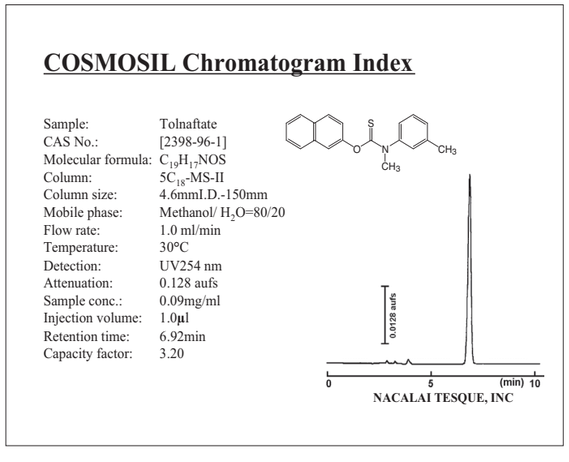
1. COSMOSIL Chromatogram Index

More than 6,100 single compound elution profiles with full chromatographic condition description are available. They are not only an incredible help for chromatographers, but also can be used as references in choosing conditions for similar compounds.

These data are available at our web site: http://www.nacalai.com



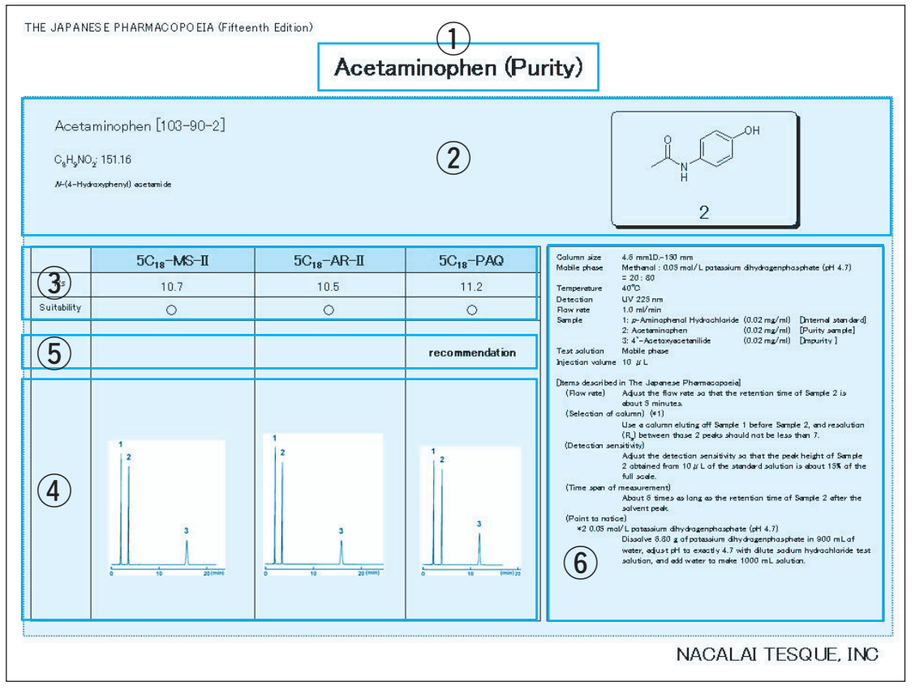
Data example



2. Application data of substances in Japanese Pharmacopoeia, 15th version

We prepare data of drugs using three kinds of C_{18} columns that are specified in HPLC analysis in Application Data of Substances in Japanese Pharmacopoeia, 15th version. The data are available at our web site.
http://www.nacalai.co.jp/en/cosmosil/TheJP15.htm, or type “Cosmosil Japanese Pharmacopoeia” at a search site.

Interpretation of application data



① Substance name

② Substance information

③ Suitability (○ : suitable, × : unsuitable, ** : depend on condition)

④ HPLC chromatogram

⑤ Recommending column

⑥ Condition and JP description

3. COSMOSIL Application Data

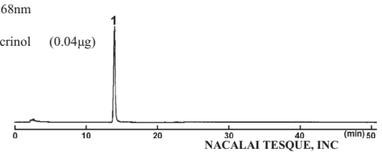
1) Drugs

● Acrinol

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 4.6mmol/l Sodium *1*-Octanesulfonate, 65mmol/l NaH_2PO_4 (pH2.8 with H_3PO_4) =30/70
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV268nm

Sample: 1; Acrinol (0.04μg)



NACALAI TESQUE, INC

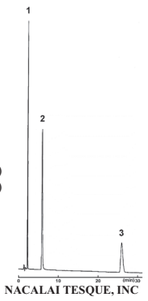
AP-0457

● Azathioprine

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 25mmol/l KH_2PO_4 (pH2.5 with H_3PO_4) = 20/80
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV296nm

Sample: 1; *6*-Mercaptopurine Hydrate (0.16μg)
2; Azathioprine (0.16μg)
3; Benzoic Acid (9.6μg)



NACALAI TESQUE, INC

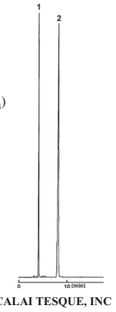
AP-0471

● Aztreonam

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 5mmol/l Tetra-*n*-butylammonium Hydrogensulfate(pH3.0 with 0.5mol/l Na_2HPO_4) = 35/65
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV280nm

Sample: 1; *4*-Aminobenzoic Acid (0.5μg)
2; Aztreonam (5.0μg)



NACALAI TESQUE, INC

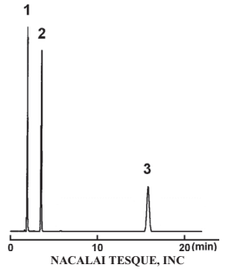
AP-0474

● Acetaminophen

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 50mmol/l KH_2PO_4 (pH4.7 with NaOH) = 20/80
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV225nm

Sample:
1; *p*-Aminophenol Hydrochloride (0.2μg)
2; Acetaminophen (0.2μg)
3; *4'*-Acetoxyacetanilide (0.2μg)



NACALAI TESQUE, INC

AP-0452

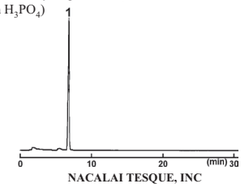
1) Drugs

● Atenolol

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/Tetrahydrofuran/ 4.6mmol/l Sodium *1*-Octanesulfonate, 1.2mmol/l Tetra-*n*-butylammonium Hydrogensulfate, 25mmol/l KH_2PO_4(pH3.0 with H_3PO_4) = 9/1/40
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV226nm

Sample: 1; Atenolol (0.1μg)



NACALAI TESQUE, INC

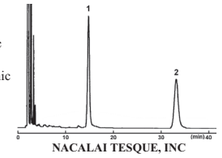
AP-0468

● Amikacin Sulfate

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 20mmol/l KH_2PO_4 (pH6.5 with KOH) = 72/28
Flow rate: 1.5 ml/min
Temperature: 35°C
Detection: UV340nm

Sample:
1; Amikacin Sulfate *2,4,6*-trinitrobenzenesufonic Acid Derivative (0.6μg)
2; Kanamycin Sulfate *2,4,6*-trinitrobenzenesufonic Acid Derivative (0.6μg)



NACALAI TESQUE, INC

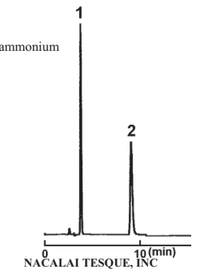
AP-0460

● Meglumine Sodium Amidotrizoate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 6.25mmol/l Tetra-*n*-butylammonium Phosphate, 50mmol/l K_2HPO_4 (pH7.0 with H_3PO_4) = 20/80
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Amidotrizoic Acid (0.25μg)
2; Acetrizoic Acid (0.30μg)



NACALAI TESQUE, INC

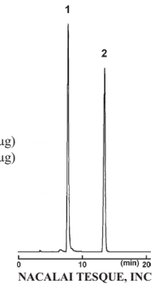
AP-0739

● Amlodipine Besilate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 30mmol/l KH_2PO_4 = 65/35
Flow rate: 0.5 ml/min
Temperature: 30°C
Detection: UV237nm

Sample: 1; Amlodipine Besilate (0.56μg)
2; Isobutyl *p*-Hydroxybenzoate (0.60μg)



NACALAI TESQUE, INC

AP-1084

● Amoxicillin

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 10mmol/l CH_3COONa (pH4.5 with CH_3COOH) = 5/95
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV230nm

Sample: 1; Amoxicillin (3.0μg)

NACALAI TESQUE, INC

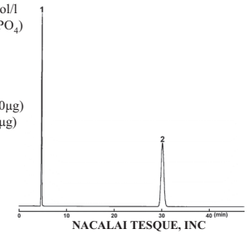
AP-0463

● Ampicillin

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: 10% Acetonitrile/ 90% 50mmol/l $(NH_4)_2HPO_4$ (pH5.0 with H_3PO_4)
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV230nm

Sample: 1; Ampicillin Sodium Salt (10μg)
2; Guaiacol Glycerol Ether (5μg)



NACALAI TESQUE, INC

AP-0464

1) Drugs

● Isoxsuprine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 32.6mmol/l $(NH_4)_2HPO_4$, 18.4mmol/l Sodium *1*-Pentanesulfonate (pH2.5 with H_3PO_4) = 40/60
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV269nm

Sample: 1; Isoxsuprine Hydrochloride (2.0μg)

NACALAI TESQUE, INC

AP-1103

● Isoniazid

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: 10mmol/l-Sodium *1*-Tridecanesulfonate-Methanol/ 50mmol/l Phosphate buffer (pH2.5) =60/40
Flow rate: 0.5 ml/min
Temperature: 40°C
Detection: UV265nm

Sample: 1; Isonicotinic Acid (0.4μg)
2; Isoniazid (0.5μg)

NACALAI TESQUE, INC

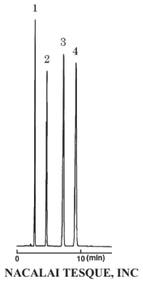
AP-0702

● Idoxuridine

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 13/87
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; *2'*-Deoxyuridine (0.3μg)
2; *5*-Iodouracil (1.2μg)
3; Idoxuridine (3.0μg)
4; Sulfathiazole (0.5μg)



NACALAI TESQUE, INC

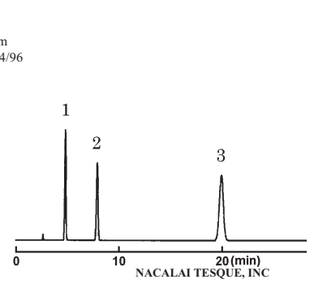
AP-0694

● Idoxuridine

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 4/96
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample:
1; *2'*-Deoxyuridine (0.04μg)
2; *5*-Iodouracil (0.12μg)
3; Idoxuridine (0.40μg)



NACALAI TESQUE, INC

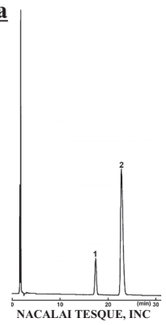
AP-0697

● Ipratropium Bromides

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.5%H_3PO_4/ Methanesulfonic Acid = 120/1000/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Ipratropium Bromide Derivative
2; Ipratropium Bromide



NACALAI TESQUE, INC

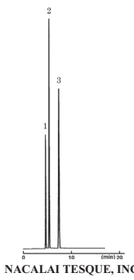
AP-0701

● Indomethacin

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 0.1%H_3PO_4 = 80/20
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; *4*-Chlorobenzoic Acid (1.0μg)
2; Butyl *p*-Hydroxybenzoate (0.6μg)
3; Indometacin(Indomethacin) (1.0μg)



NACALAI TESQUE, INC

AP-0698

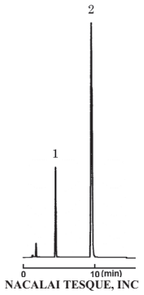
1) Drugs

● Estradiol Benzoate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 35°C
Detection: UV230nm

Sample: 1; Progesterone (0.15μg)
2; Estradiol Benzoate (0.65μg)



NACALAI TESQUE, INC

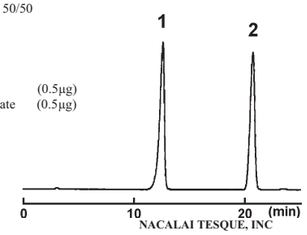
AP-0647

● Estriol

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 50/50
Flow rate: 0.5 ml/min
Temperature: 25°C
Detection: UV280nm

Sample: 1; Estriol (0.5μg)
2; Methyl Benzoate (0.5μg)



NACALAI TESQUE, INC

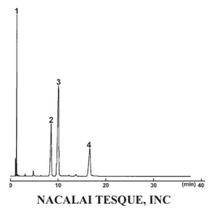
AP-0644

● Epirubicin Hydrochloride

COSMOSIL Application Data

Column: 5TMS-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: 6.9mmol/l Sodium Lauryl Sulfate-H_2O/Acetonitrile/Methanol/H_3PO_4 = 540/290/170/1
Flow rate: 2.0 ml/min
Temperature: 35°C
Detection: UV254nm

Sample:
1; *2*-Naphthalenesulfonic Acid Sodium(5.0μg)
2; Doxorubicin Hydrochloride (5.0μg)
3; Epirubicin Hydrochloride (10μg)
4; Daunorubicin Hydrochloride (5.0μg)



NACALAI TESQUE, INC

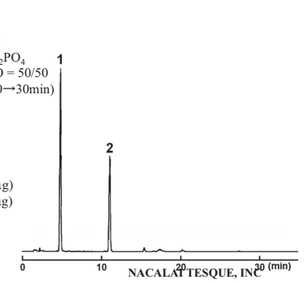
AP-0643

● Oxytocin

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 100mmol/l NaH_2PO_4
B; Acetonitrile/H_2O = 50/50
B conc. 30→60%(0→30min)
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV220nm

Sample:
1; [Arg^8]-Vasopressin (5.0μg)
2; Oxytocin Acetate Salt (5.0μg)



NACALAI TESQUE, INC

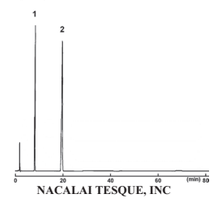
AP-0793

● Omeprazole

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 7.9mmol/l Na_2HPO_4, 1.35mmol/l NaH_2PO_4(pH7.6 with 1% H_3PO_4) = 11/29
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: 1; Omeprazole (0.10μg)
2; *1,2*-Dinitrobenzene (0.25μg)



NACALAI TESQUE, INC

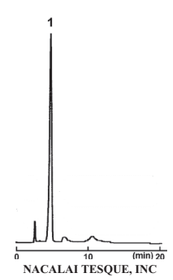
AP-1121

● Captopril

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Metahnol/ 0.1%Acetic Acid = 50/50
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV220nm

Sample: 1; Captopril (2.6μg)



NACALAI TESQUE, INC

AP-0530

1) Drugs

● Gabexate Mesilate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ (0.1%Sodium Lauryl Sulfate/ 0.5%Sodium *1*-Heptanesulfonate/ Acetic Acid = 200/20/1) = 71/29
Flow rate: 0.5 ml/min
Temperature: 25°C
Detection: UV245nm

Sample:
1; Ethyl *p*-Hydroxybenzoate (0.39μg)
2; Butyl *p*-Hydroxybenzoate (0.39μg)
3; Gabexate Mesilate (0.75μg)

NACALAI TESQUE, INC

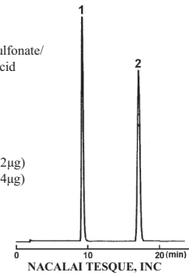
AP-0673

● Camostat Mesilate

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Metahnol/ (0.2%Sodium *1*-Heptane Sulfonate/ 0.1%Sodium Lauryl Sulfate/ Acetic Acid = 1000/500/10) = 55/45
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV265nm

Sample:
1; Camostat Mesilate (1.02μg)
2; Butyl *p*-Hydroxybenzoate (0.54μg)



NACALAI TESQUE, INC

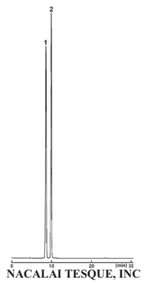
AP-0528

● Carbazochrome Sodium Sulfonate

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Ethanol/ 10.4mmol/l $(NH_4)_2HPO_4$ = 75/925(pH7 with H_3PO_4)
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV360nm

Sample:
1; Carbazochrome Sodium Sulfonate (1.0μg)
2; Carbazochrome (1.0μg)



NACALAI TESQUE, INC

AP-0535

● Carbidopa

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Ethanol/ 50mmol/l NaH_2PO_4 = 5/95 (pH2.7 with H_3PO_4)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample:
1; Methyldopa (10μg)
2; Carbidopa (10μg)

NACALAI TESQUE, INC

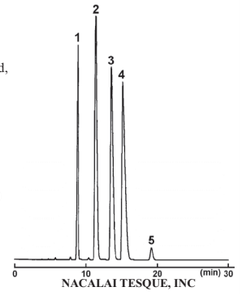
AP-0538

● Quinidine Sulfate and Quinine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 0.088%Acetic Acid, 0.16%Methanesulfonic Acid, 0.22%Diethylamine = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV235nm

Sample:
1; Cinchonidine (1.0μg)
2; Quinidine Sulfate (10μg)
3; Quinine Hydrochloride (10μg)
4; Hydroquinidine Hydrochloride (10μg)
5; Dihydroquinine



NACALAI TESQUE, INC

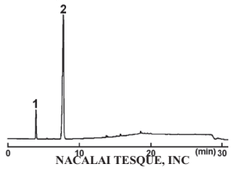
AP-0828

● Potassium Clavulanate

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 50mmol/l NaH_2PO_4(pH4.0 with H_3PO_4)
B; Methanol/ 50mmol/l NaH_2PO_4 (pH4.0 with H_3PO_4) = 50/50
B conc. 0%(0-4 min), 0→100%(4→15 min), 100%(15-25min)
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV230nm

Sample:
1; Potassium Clavulanate
2; Sodium Amoxycillin



NACALAI TESQUE, INC

AP-0810

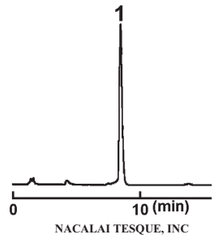
1) Drugs

● Clarithromycin

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 67mmol/l KH_2PO_4 = 35/65
Flow rate: 1.0 ml/min
Temperature: 50°C
Detection: UV210nm

Sample: 1; Clarithromycin (2.8μg)



NACALAI TESQUE, INC

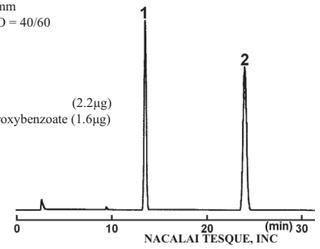
AP-0578

● Griseofulvin

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ H_2O = 40/60
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample:
1; Griseofulvin (2.2μg)
2; Butyl *p*-Hydroxybenzoate (1.6μg)



NACALAI TESQUE, INC

AP-0676

● Clindamycin Phosphate

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 100mmol/l KH_2PO_4 (pH2.5 with H_3PO_4) = 22/78
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV210nm

Sample:
1; Lincomycin Hydrochloride (4.0μg)
2; Clindamycin Phosphate (4.0μg)
3; Methyl *p*-Hydroxybenzoate (0.3μg)

NACALAI TESQUE, INC

AP-0584

● Clindamycin Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 50mmol/l KH_2PO_4 (pH7.5 with KOH) = 45/55
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV210nm

Sample: 1; Clindamycin Hydrochloride (15μg)

NACALAI TESQUE, INC

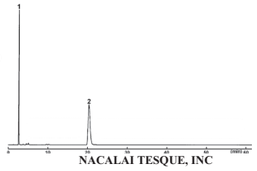
AP-0581

● Cloxacillin Sodium

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 50mmol/l $(NH_4)_2HPO_4$ = 25/75(pH4.0 with H_3PO_4)
Flow rate: 1.5 ml/min
Temperature: 25°C
Detection: UV230nm

Sample:
1; Guaiacol Glycerol Ether (5.0μg)
2; Cloxacillin Sodium Monohydrate (10μg)



NACALAI TESQUE, INC

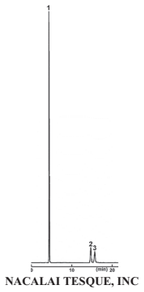
AP-0585

● Clofibrate

COSMOSIL Application Data

Column: 5CN-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Hexane/*2*-Propanol/Acetic Acid = 1970/30/1
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV275nm

Sample:
1; Clofibrate (2.0μg)
2; *4*-Chlorophenol (0.12μg)
3; *4*-Ethoxyphenol (0.12μg)



NACALAI TESQUE, INC

AP-0588

1) Drugs

● Clofibrate

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 0.1%Acetic Acid = 60/40
Flow rate: 1.5 ml/min
Temperature: 25°C
Detection: UV275nm

Sample: 1; *4*-Chlorophenol (4.0μg)
2; Ibuprofen (60μg)
3; Clofibrate (10μg)

NACALAI TESQUE, INC

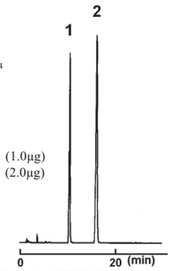
AP-0590

● Clobetasol Propionate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ Methanol/ 50mmol/l NaH_2PO_4 (pH2.5 with H_3PO_4) = 47.5/10/42.5
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV240nm

Sample: 1; Clobetasol Propionate (1.0μg)
2; Beclomethasone Dipropionate (2.0μg)



NACALAI TESQUE, INC

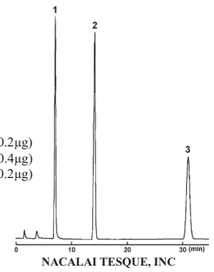
AP-1098

● Cloperastine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 100mmol/l KH_2PO_4, 0.16%Perchloric acid = 60/40
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV222nm

Sample: 1; Cloperastine Hydrochloride (0.2μg)
2; Benzophenone (0.4μg)
3; *4*-Chlorobenzophenone (0.2μg)



NACALAI TESQUE, INC

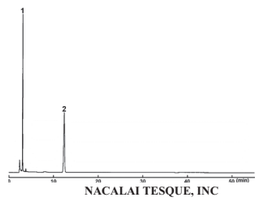
AP-0593

● Chlorpheniramine Maleate

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 74.5mmol/l $(NH_4)H_2PO_4$, 14.7mmol/l H_3PO_4 = 20/80
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV225nm

Sample:
1; Maleic Acid (Impurity)
2; Chlorpheniramine Maleate (0.06μg)



NACALAI TESQUE, INC

AP-0568

● Chlorpropamide

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 1%Acetic Acid = 50/50
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV240nm

Sample: 1; Chlorpropamide (1.0μg)

NACALAI TESQUE, INC

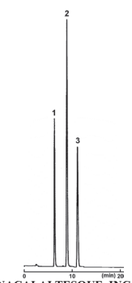
AP-0570

● Chlormadinone Acetate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/H_2O = 65/35
Flow rate: 0.5 ml/min
Temperature: 30°C
Detection: UV236nm

Sample: 1; Butyl *p*-Hydroxybenzoate (0.2μg)
2; *17α*-Acetoxyprogesterone (0.2μg)
3; Chlormadinone Acetate (0.8μg)



NACALAI TESQUE, INC

AP-0563

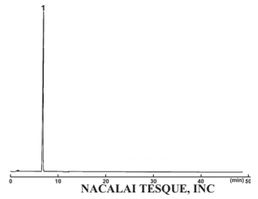
1) Drugs

● Ketoprofen

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/H_2O/ 0.5mol KH_2PO_4 (pH3.5 with H_3PO_4) = 43/55/2
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV233nm

Sample: 1; Ketoprofen (0.4μg)



NACALAI TESQUE, INC

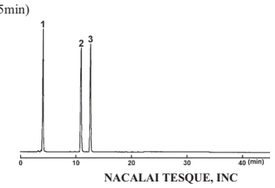
AP-0709

● Cortisone

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; Acetonitrile/ H_2O =30/70
B; Acetonitrile/ H_2O =70/30
B conc. 10%(0-5min)
10→90%(5→25min)
90%(25-30min)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample:
1; Cortisone (3.6μg)
2; Cortisone Acetate (3.75μg)
3; Hydrocortisone Acetate (3.6μg)



NACALAI TESQUE, INC

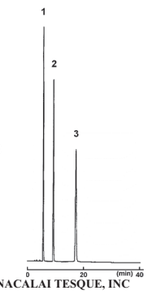
AP-0595

● Salicylic Acid

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 1.67% Acetic Acid = 40/60
Flow rate: 0.5 ml/min
Temperature: 35°C
Detection: UV270nm

Sample: 1; *p*-Hydroxybenzoic Acid (0.025μg)
2; Phenol (0.10μg)
3; Salicylic Acid (0.50μg)



NACALAI TESQUE, INC

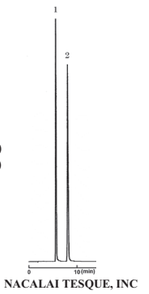
AP-1123

● Santonin

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/H_2O = 50/50
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Santonin (0.50μg)
2; Ethyl *p*-Hydroxybenzoate (0.24μg)



NACALAI TESQUE, INC

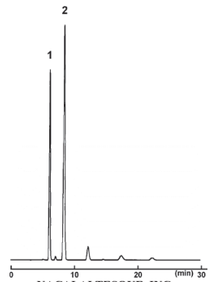
AP-0849

● Cyanocobalamins

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 70mmol/l Na_2HPO_4 (pH3.5 with H_3PO_4) = 53/147
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV361nm

Sample: 1; Cyanocobalamin
2; Cyanocobalamin Derivative



NACALAI TESQUE, INC

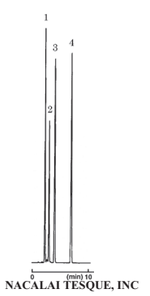
AP-1101

● Digitoxin

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV230nm

Sample: 1; Digoxin (1.0μg)
2; Gitoxin (0.5μg)
3; Digitoxin (0.5μg)
4; Acenaphthene (0.03μg)



NACALAI TESQUE, INC

AP-0620

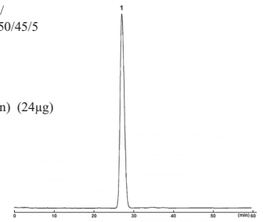
1) Drugs

● Cyclosporin

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 0.22%H_3PO_4 / *tert*-Butyl Methyl Ether = 50/45/5
Flow rate: 1.0 ml/min
Temperature: 50°C
Detection: UV210nm

Sample: 1; Ciclosporin(Cyclosporin) (24µg)



NACALAI TESQUE, INC

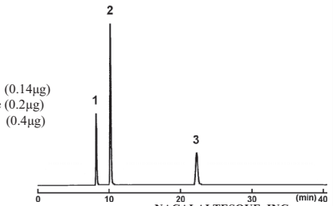
AP-0574

● Diclofenac Sodium

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 0.12%Acetic Acid = 70/30
Flow rate: 0.5 ml/min
Temperature: 40°C
Detection: UV240nm

Sample:
1; Ethyl *p*-Hydroxybenzoate (0.14µg)
2; Propyl *p*-Hydroxybenzoate (0.2µg)
3; Diclofenac Sodium (0.4µg)



NACALAI TESQUE, INC

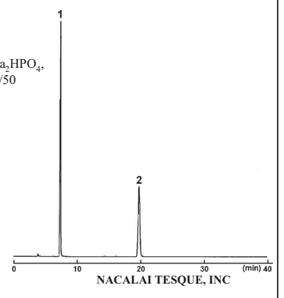
AP-0613

● Diclofenamide

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 40mmol/l Na_2HPO_4, 52mmol/l NaH_2PO_4 = 50/50
Flow rate: 0.5 ml/min
Temperature: 30°C
Detection: UV280nm

Sample:
1; Diclofenamide (10µg)
2; Butyl *p*-Hydroxybenzoate (1.2µg)



NACALAI TESQUE, INC

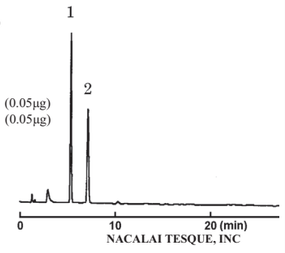
AP-0615

● Disulfiram

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV210nm

Sample: 1; Benzophenone (0.05µg)
2; Disulfiram (0.05µg)



NACALAI TESQUE, INC

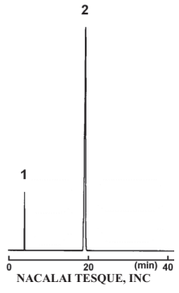
AP-0625

● Zidovudine

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ H_2O = 20/80
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV265nm

Sample: 1; Thymine (0.08µg)
2; Zidovudine (2.0µg)



NACALAI TESQUE, INC

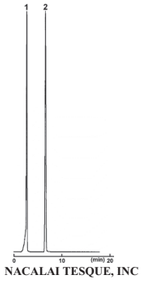
AP-1130

● Dipyridamole

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 7.5mmol/l KH_2PO_4 = 80/20
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV280nm

Sample: 1; Dipyridamole (2.8µg)
2; *p*-Terphenyl (1.2µg)



NACALAI TESQUE, INC

AP-0624

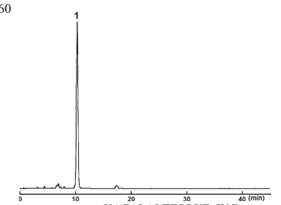
1) Drugs

● Josamycin

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.8mol Sodium Perchlorate (pH2.5 with HCl) = 40/60
Flow rate: 2.0 ml/min
Temperature: 40°C
Detection: UV231nm

Sample: 1; Josamycin (10µg)



NACALAI TESQUE, INC

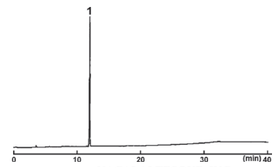
AP-0706

● Cilastatin Sodium Salt

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: A; 0.1%H_3PO_4
B; Acetonitrile/ 0.1%H_3PO_4 = 30/70
B conc. 15→30%(0→30min), 100%(30-40min)
Flow rate: 2.0 ml/min
Temperature: 50°C
Detection: UV210nm

Sample:
1; Cilastatin Sodium Salt (1.0µg)



NACALAI TESQUE, INC

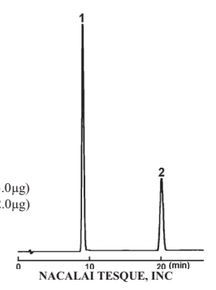
AP-0576

● Diltiazem Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/Acetonitrile/ 118mmol/l CH_3COONa, 6.5mmol/l *d*-Camphorsulfonic Acid = 25/25/50(pH6.68)
Flow rate: 1.0 ml/min
Temperature: 50°C
Detection: UV240nm

Sample: 1; Diltiazem Hydrochloride (3.0µg)
2; Phenyl Benzoate (2.0µg)



NACALAI TESQUE, INC

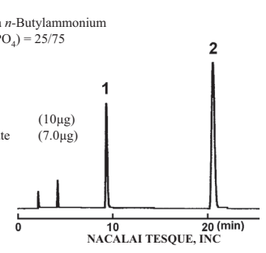
AP-0621

● Sulbactam Sodium

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 5mmol/l Tetra *n*-Butylammonium Hydroxide(pH4.0 with H_3PO_4) = 25/75
Flow rate: 1.0 ml/min
Temperature: 35°C
Detection: UV220nm

Sample: 1; Sulbactam Sodium (10µg)
2; Ethyl *p*-Hydroxybenzoate (7.0µg)



NACALAI TESQUE, INC

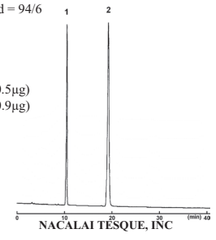
AP-0853

● Cetirizine Hydrochloride

COSMOSIL Application Data

Column: 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 40mmol/l Sulfuric Acid = 94/6
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV230nm

Sample: 1; Cetirizine Dihydrochloride (0.5µg)
2; *4*-Dimethylaminoantipyrine (0.9µg)



NACALAI TESQUE, INC

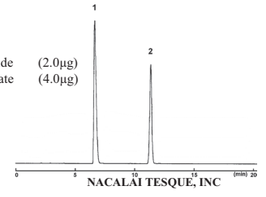
AP-1096

● Cetirizine Hydrochloride

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 1.7mmol/l Sodium *1*-Heptanesulfonate = 42/58 (pH3.0 with 0.5mol/l Sulfuric Acid)
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV230nm

Sample: 1; Cetirizine Dihydrochloride (2.0µg)
2; Propyl *p*-Hydroxybenzoate (4.0µg)



NACALAI TESQUE, INC

AP-1097

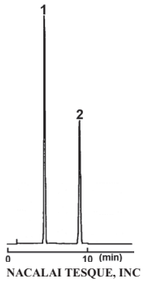
1) Drugs

● Cefaclor

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 50mmol/l KH_2PO_4 (pH3.4 with H_3PO_4) =6/94
Flow rate: 2.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample:
1; Cefaclor (2.0µg)
2; *4*-Aminoacetophenone (2.9µg)



NACALAI TESQUE, INC

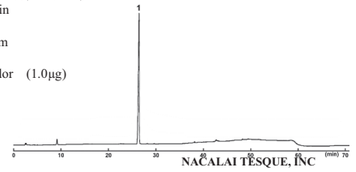
AP-0541

● Cefaclor

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: A; 50mmol/l NaH_2PO_4(pH4.0 with H_3PO_4)
B; Acetonitrile/Buffer A = 45/55
B conc. 5→25%(0-30min), 25→100%(30-45min), 100%(45-55min)
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV220nm

Sample:
1; Cefaclor (1.0µg)



NACALAI TESQUE, INC

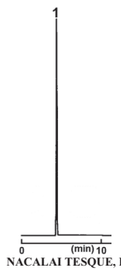
AP-0542

● Cefadroxil

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 10mmol/ KH_2PO_4 = 60/340
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV262nm

Sample:
1; Cefadroxil (1.3µg)



NACALAI TESQUE, INC

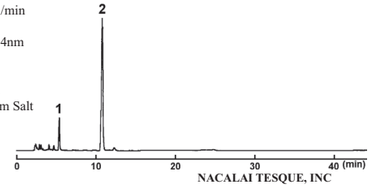
AP-0545

● Cephalothin Sodium Salt

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/Ethanol/ 158mmol/l CH_3COONa, 0.076%Acetic Acid(pH5.9 with NaOH) =15/7/78
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample:
1; Similar compound
2; Cephalothin Sodium Salt (0.25µg)



NACALAI TESQUE, INC

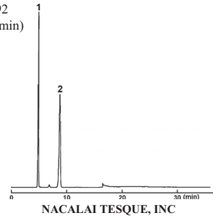
AP-0548

● Cefsulodin Sodium Salt

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: A; Acetonitrile/1%$(NH_4)_2SO_4$ = 3/97
B; Acetonitrile/1%$(NH_4)_2SO_4$ = 8/92
B conc. 0%(0-14min), 100%(14-30min)
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample:
1; Isonicotinamide (0.2µg)
2; Cefsulodin Sodium Salt Hydrate (0.2µg)



NACALAI TESQUE, INC

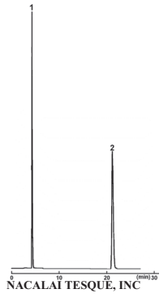
AP-0553

● Ceftazidime

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 50mmol/l $(NH_4)H_2PO_4$ (pH3.5 with H_3PO_4) = 13/87
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample:
1; Ceftazidime (2.5µg)
2; Acetanilide (2.5µg)



NACALAI TESQUE, INC

AP-0555

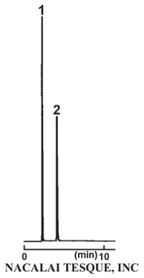
1) Drugs

● Ceftazidime

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 50mmol/l $(NH_4)H_2PO_4$ = 30/70(pH7.0 with NH_3)
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample:
1; Ceftazidime (0.5µg)
2; Pyridine (0.5µg)



NACALAI TESQUE, INC

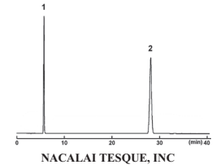
AP-0557

● Ceftriaxone Sodium

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: 18.1mmol/l tetra-*n*-heptylammonium bromide-Acetonitrile / 4.1mmol/l Na_2HPO_4, 2.6mmol/l KH_2PO_4, 0.88mmol/l Citric Acid, 1.8mmol/l NaOH = 45/55
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample:
1; Ceftriaxone Sodium (0.5µg)
2; Diethyl Terephthalate (0.9µg)



NACALAI TESQUE, INC

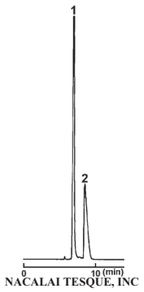
AP-0560

● Daunorubicin Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ H_2O = 38/62 (pH2.2 with H_3PO_4)
Flow rate: 0.5 ml/min
Temperature: 25°C
Detection: UV254nm

Sample:
1; Daunorubicin Hydrochloride (5.0µg)
2; *2*-Naphthalenesulfonic Acid (10µg)



NACALAI TESQUE, INC

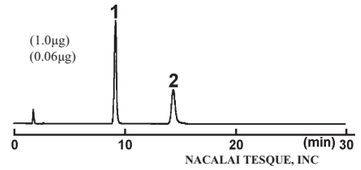
AP-0602

● Dantrolene Sodium

COSMOSIL Application Data

Column: 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Hexane/Acetic Acid/Ethanol = 90/10/9
Flow rate: 2.0 ml/min
Temperature: 30°C
Detection: UV300nm

Sample:
1; Theophylline (1.0µg)
2; Dantrolene Sodium (0.06µg)



NACALAI TESQUE, INC

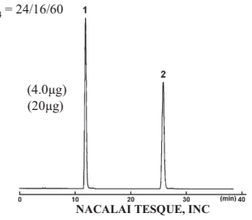
AP-0601

● Thiamine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/Acetonitrile/ 5mmol/l Sodium *1*-Octanesulfonate, 1%H_3PO_4 = 24/16/60
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample:
1; Thiamine Hydrochloride (4.0µg)
2; Methyl Benzoate (20µg)



NACALAI TESQUE, INC

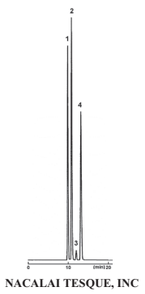
AP-0857

● Thiopental Sodiums

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 7mmol/l KH_2PO_4 (pH3.0 with H_3PO_4) = 30/70
Flow rate: 1.5 ml/min
Temperature: 40°C
Detection: UV254nm

Sample:
1; Isopropyl *p*-Hydroxybenzoate (1.0µg)
2; Propyl *p*-Hydroxybenzoate (1.0µg)
3; Thiopental Sodium Isomer
4; Thiopental Sodium (4.8µg)



NACALAI TESQUE, INC

AP-0859

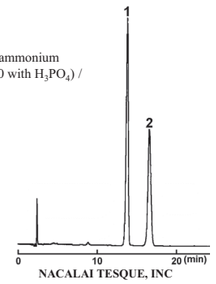
1) Drugs

● Ticarcillin Sodium

COSMOSIL Application Data

Column: 5TMS-MS
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 5mmol/l Tetra-*n*-Butylammonium Bromide, 25mmol/l NaH_2PO_4(pH3.0 with H_3PO_4) / Acetic Acid = 225/1000/2.5
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV230nm

Sample: 1; *o*-Toluic Acid (2.5µg)
2; Ticarcillin Sodium (7.6µg)



NACALAI TESQUE, INC

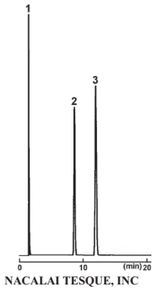
AP-0862

● Tipepidine Hibenzate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Tetrahydrofuran/ 1%Ammonium Acetate = 30/70
Flow rate: 1.0 ml/min
Temperature: 50°C
Detection: UV254nm

Sample: 1; Hibenzic Acid
2; Tipepidine
3; Propyl *p*-Hydroxybenzoate (0.6µg)



NACALAI TESQUE, INC

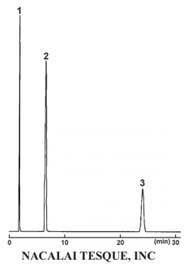
AP-0864

● Tipepidine Hibenzate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 0.2%Ammonium Acetate = 65/35
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; Hibenzic Acid
2; Tipepidine
3; Xanthene (0.8µg)



NACALAI TESQUE, INC

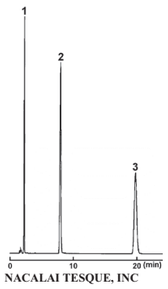
AP-0867

● Tipepidine Hibenzate

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: (Acetonitrile/ 2-Propanol = 2/1) / 0.1%Sodium Lauryl Sulfate, 0.2%H_3PO_4 = 50/50
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; Hibenzic Acid
2; Tipepidine
3; Dibucaine Hydrochloride (1.6µg)



NACALAI TESQUE, INC

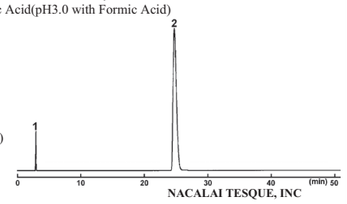
AP-0871

● Timolol Maleate

COSMOSIL Application Data

Column: 5PE-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/Methanol/ 5mmol/l Sodium *1*-Hexanesulfonate, 0.3%Triethylamine, 0.4%Formic Acid(pH3.0 with Formic Acid) = 5/25/70
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV280nm

Sample:
1; Maleic Acid
2; Timolol Maleate (7.5µg)



NACALAI TESQUE, INC

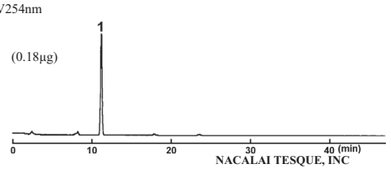
AP-0863

● Dexamethasone

COSMOSIL Application Data

Column: 5PE-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 21mmol/l Ammonium Formate (pH3.6 with Formic Acid) = 33/67
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample:
1; Dexamethasone (0.18µg)



NACALAI TESQUE, INC

AP-0611

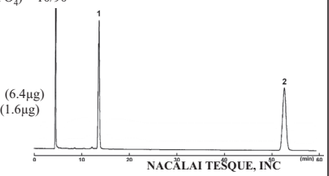
1) Drugs

● Deferoxamine Mesilate

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: 2-Propanol/ 10.5mmol/l $(NH_4)_2HPO_4$, 1.05mmol/l EDTA, 5.6mmol/l Sodium *1*-Heptanesulfonate (pH2.8 with H_3PO_4) = 10/90
Flow rate: 0.5 ml/min
Temperature: 25°C
Detection: UV230nm

Sample:
1; Deferoxamine Mesilate (6.4µg)
2; Methyl *p*-Hydroxybenzoate (1.6µg)



NACALAI TESQUE, INC

AP-0606

● Doxycycline Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ *N,N*-Dimethyloctylamine/ 100mmol/l NaH_2PO_4 = 550/3/450 (pH8.0 with NaOH)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: 1; Doxycycline Hydrochloride (10µg)

NACALAI TESQUE, INC

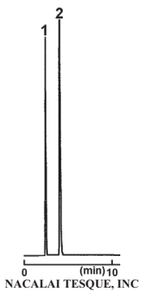
AP-0640

● Doxifluridine

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 35/65
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Doxifluridine (0.5µg)
2; Caffeine (1.0µg)



NACALAI TESQUE, INC

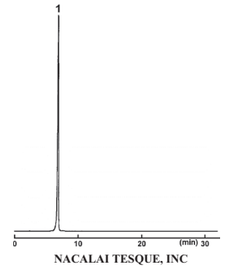
AP-0635

● Doxorubicin Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 10.4mmol/l Sodium Lauryl Sulfate, 0.14%H_3PO_4=50/50
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Doxorubicin Hydrochloride (5.0µg)



NACALAI TESQUE, INC

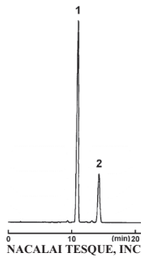
AP-0637

● Tocopherols

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 98/2
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV292nm

Sample: 1; α-Tocopherol (20µg)
2; Tocopherol Acetate (20µg)



NACALAI TESQUE, INC

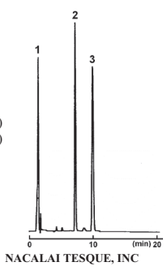
AP-0873

● Tocopherol Nicotinate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol
Flow rate: 1.0 ml/min
Temperature: 35°C
Detection: UV264nm

Sample: 1; Nicotinic Acid (0.75µg)
2; Tocopherol (12.5µg)
3; Tocopherol Nicotinate (2.5µg)



NACALAI TESQUE, INC

AP-0876

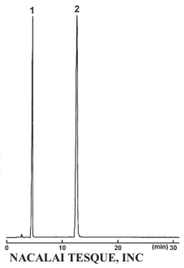
1) Drugs

● Todralazine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 5.4mmol/l Sodium *1*-Heptanesulfonate = 40/60 (pH3.5 with Acetic Acid)
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV240nm

Sample: 1; Potassium Biphthalate (0.4µg)
2; Todralazine Hydrochloride (0.4µg)



NACALAI TESQUE, INC

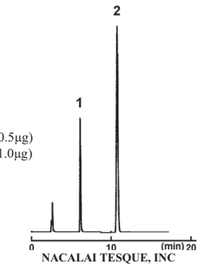
AP-0879

● Dopamine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: 200mmol/l Na_2HPO_4 (pH3.0 with Citric Acid)
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV280nm

Sample: 1; Uracil (0.5µg)
2; Dopamine Hydrochloride (1.0µg)



NACALAI TESQUE, INC

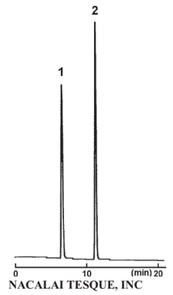
AP-0631

● Dobutamine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 20mmol/l Tartrate buffer (pH3.0) = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: 1; Dobutamine Hydrochloride (11µg)
2; Salicylamide (8.5µg)



NACALAI TESQUE, INC

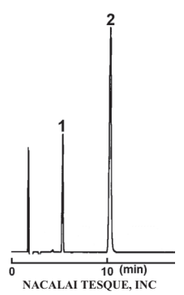
AP-0628

● Tolazamide

COSMOSIL Application Data

Column: 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Hexane/ Water-saturated Hexane/ Tetrahydrofuran/ Ethanol/ Acetic Acid = 475/ 475/ 20/ 15/ 9
Flow rate: 2.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Tolbutamide (7.5µg)
2; Tolazamide (30µg)



NACALAI TESQUE, INC

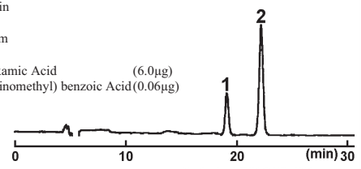
AP-0882

● Tranexamic Acid

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 152mmol/l NaH_2PO_4, 8mmol/l Sodium Lauryl Sulfate, 0.83%Triethylamine(pH2.5 with H_3PO_4) = 40/60
Flow rate: 0.5 ml/min
Temperature: 35°C
Detection: UV220nm

Sample: 1; Tranexamic Acid (6.0µg)
2; *4*-(Aminomethyl) benzoic Acid (0.06µg)



NACALAI TESQUE, INC

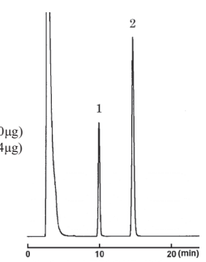
AP-0888

● Triamcinolone

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 25/75
Flow rate: 0.5 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Triamcinolone (1.0µg)
2; Methyl *p*-Hydroxybenzoate (0.4µg)



NACALAI TESQUE, INC

AP-0889

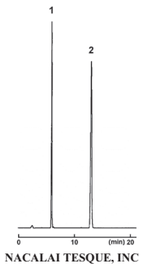
1) Drugs

● Triamcinolone Acetonide

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ H_2O = 35/65
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV240nm

Sample: 1; Prednisolone (0.4µg)
2; Triamcinolone Acetonide (0.8µg)



NACALAI TESQUE, INC

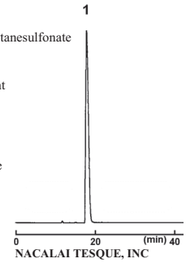
AP-0892

● Trimetazidine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; Methanol/ 14.2mmol/l Sodium *1*-Heptanesulfonate (pH 3.0 with 10% H_3PO_4) = 2/3
B; Methanol
B conc. 5%→25% 50min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV240nm

Sample: 1; *1*-(*2,3,4*-Trimethoxybenzyl)piperazine Dihydrochloride (40µg)



NACALAI TESQUE, INC

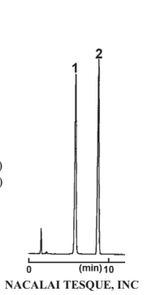
AP-1125

● Trimetazidine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 50mmol/l KH_2PO_4 (pH3.0 with H_3PO_4) = 15/85
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV230nm

Sample: 1; Trimetazidine Hydrochloride (0.15µg)
2; *p*-Hydroxybenzoic Acid (0.18µg)



NACALAI TESQUE, INC

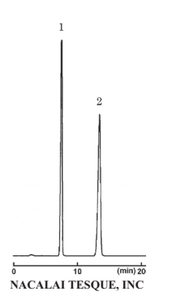
AP-0895

● Tolnaftate

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Diphenyl Phthalate (18µg)
2; Tolnaftate (4.0µg)



NACALAI TESQUE, INC

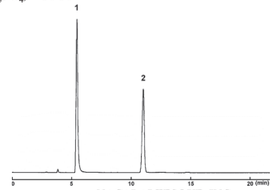
AP-0885

● Domperidone

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 15.6mmol/l K_2HPO_4 (pH3.5 with 20mmol/l H_3PO_4) = 50/50
Flow rate: 1.0 ml/min
Temperature: 35°C
Detection: UV287nm

Sample:
1; Domperidone (0.1µg)
2; Ethyl *p*-hydroxybenzoate (0.2µg)



NACALAI TESQUE, INC

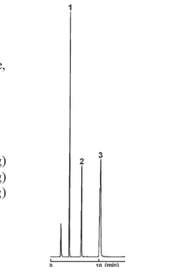
AP-1102

● Naphazoline and Chlorpheniramine

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 0.2%Sodium Lauryl Sulfate, 0.1%H_3PO_4 = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; *o*-Ethoxybenzamide (5.1µg)
2; Naphazoline Nitrate (2.2µg)
3; Chlorpheniramine Maleate (4.1µg)



NACALAI TESQUE, INC

AP-0954

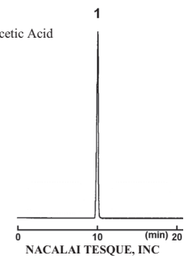
1) Drugs

● Nabumetone

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ Tetrahydrofuran/ 0.1% Acetic Acid = 28/12/60
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; Nabumetone (10.0µg)



NACALAI TESQUE, INC

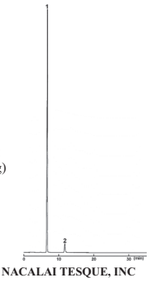
AP-1113

● Nalidixic Acid

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 40mmol/l NaH_2PO_4 (pH2.8 with H_3PO_4) = 40/60
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV260nm

Sample: 1; Methyl *p*-Hydroxybenzoate (0.13µg)
2; Nalidixic Acid (0.005µg)



NACALAI TESQUE, INC

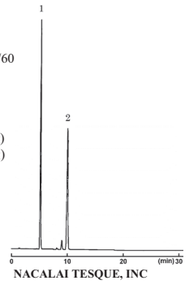
AP-0770

● Nicardipine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.05%Perchloric Acid = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Nicardipine Hydrochloride (0.4µg)
2; Nifedipine (0.4µg)



NACALAI TESQUE, INC

AP-0775

● Nicardipine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 10mmol/l KH_2PO_4 = 68/32
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; Nicardipine Hydrochloride (0.4µg)
2; Di-*n*-butyl Phthalate (1.3µg)

NACALAI TESQUE, INC

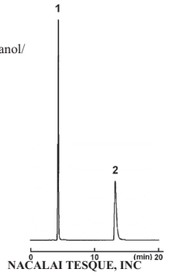
AP-0778

● Nicotinic Acid

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: 5mmol/l Sodium *1*-Octanesulfonate-Methanol/ 50mmol/l NaH_2PO_4(pH3.0) = 20/80
Flow rate: 0.5 ml/min
Temperature: 35°C
Detection: UV260nm

Sample: 1; Nicotinic Acid (1.0µg)
2; Caffeine (1.0µg)



NACALAI TESQUE, INC

AP-0788

● Nicotinamide

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 5mmol/l Sodium *1*-Heptanesulfonate = 30/70
Flow rate: 0.5 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Nicotinic Acid (4.0µg)
2; Nicotinamide (0.8µg)

NACALAI TESQUE, INC

AP-0784

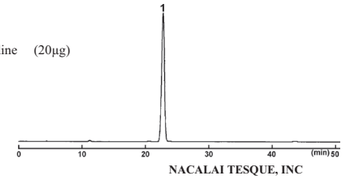
1) Drugs

● Nicergolin

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/Acetonitrile/ 50mmol/l KH_2PO_4 (pH7.0 with Triethylamine) = 35/30/35
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV288nm

Sample: 1; Nicergoline (20µg)



NACALAI TESQUE, INC

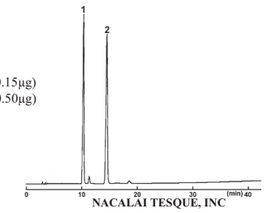
AP-0781

● Nitrendipine

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/Tetrahydrofuran/H_2O = 20/24/56
Flow rate: 0.5 ml/min
Temperature: 30°C
Detection: UV254nm

Sample:
1; Propyl *p*-Hydroxybenzoate (0.15µg)
2; Nitrendipine (0.50µg)



NACALAI TESQUE, INC

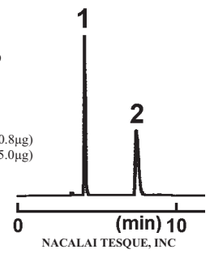
AP-0790

● Neostigmine Methylsulfate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 20mmol/l NaH_2PO_4 (pH3.0 with H_3PO_4), 5mmol/l Sodium *1*-Pentanesulfonate = 11/89
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV259nm

Sample: 1; Dimethylaminophenol (0.8µg)
2; Neostigmine Methylsulfate (5.0µg)



NACALAI TESQUE, INC

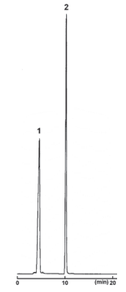
AP-0772

● Baclofen

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 0.11%Acetic acid = 60/40
Flow rate: 0.5 ml/min
Temperature: 25°C
Detection: UV268nm

Sample: 1; Baclofen (5.0µg)
2; Methyl *p*-Hydroxybenzoate (0.063µg)



NACALAI TESQUE, INC

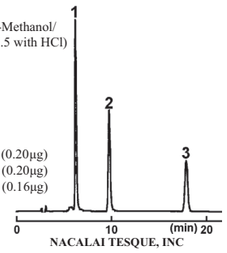
AP-0477

● Haloperidol

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: 3.5mmol/l Sodium Lauryl Sulfate-Methanol/ 10mmol/l *tri*-Sodium Citrate(pH3.5 with HCl) = 75/25
Flow rate: 0.5 ml/min
Temperature: 40°C
Detection: UV220nm

Sample:
1; *4*-(*4*-Chlorophenyl)-*4*-hydroxypiperidine (0.20µg)
2; Haloperidol (0.20µg)
3; Biphenyl (0.16µg)



NACALAI TESQUE, INC

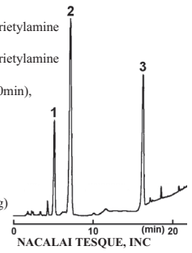
AP-0680

● Vancomycin Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: A; Acetonitrile/Tetrahydrofuran/ 0.2%Trietylamine (pH3.2 with H_3PO_4) = 7/1/92
B; Acetonitrile/Tetrahydrofuran/ 0.2%Trietylamine (pH3.2 with H_3PO_4) = 29/1/70
B conc. 0%(0-12min), 0→100%(12→20min), 100%(20-22min)
Flow rate: 1.5 ml/min
Temperature: 25°C
Detection: UV280nm

Sample: 1; Similar compound 1
2; Vancomycin Hydrochloride (5.0µg)
3; Similar compound 2



NACALAI TESQUE, INC

AP-0901

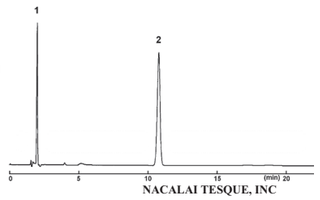
1) Drugs

● Bisoprolol Fumarate

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 30mmol/l KH_2PO_4 (pH2.5 with H_3PO_4) = 20/80
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV225nm

Sample: 1; Fumaric Acid
2; Bisoprolol



NACALAI TESQUE, INC

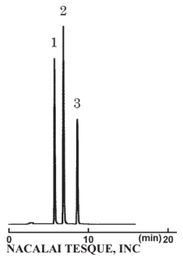
AP-1090

● Hydrochlorothiazide

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 100mmol/l NaH_2PO_4 (pH3.0 with H_3PO_4) =20/80
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample:
1; *4*-Amino-*6*-chlorobenzene -*1,3*-disulfonamide (1.0μg)
2; Hydrochlorothiazide (3.0μg)
3; *4*-Aminoacetophenone (3.6μg)



NACALAI TESQUE, INC

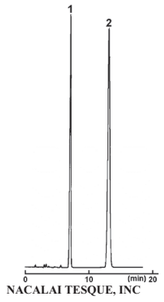
AP-0683

● Hydrocortisone

COSMOSIL Application Data

Column: 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Chloroform/Methanol/Acetic Acid = 1000/20/1
Flow rate: 2.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Prednisone (0.9μg)
2; Hydrocortisone (2.0μg)



NACALAI TESQUE, INC

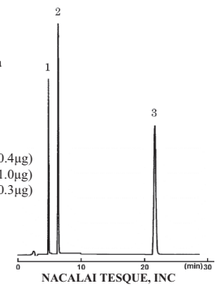
AP-0685

● Hydrocortisone Succinate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 40mmol/l CH_3COONa (pH4.0 with Acetic Acid) = 40/60
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Hydrocortisone (0.4μg)
2; Hydrocortisone Succinate (1.0μg)
3; Butyl *p*-Hydroxybenzoate (0.3μg)



NACALAI TESQUE, INC

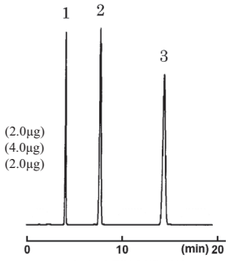
AP-0689

● Hydrocortisone Acetate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ H_2O = 45/55
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Hydrocortisone (2.0μg)
2; Hydrocortisone Acetate (4.0μg)
3; Benzyl *p*-Hydroxybenzoate (2.0μg)



NACALAI TESQUE, INC

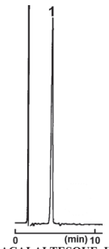
AP-0686

● Hypromellose Phthalate (impurity)

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 100mmol/l Cyanoacetic Acid = 15/85
Flow rate: 2.0 ml/min
Temperature: 30°C
Detection: UV235nm

Sample: 1; Phthalic Acid (0.5μg)



NACALAI TESQUE, INC

AP-0933

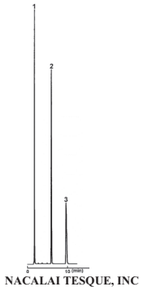
1) Drugs

● Piperacillin Sodium

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 50mmol/l Acetic Acid, 25mmol/l Triethylamine = 21/79
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Ampicillin (10μg)
2; Acetanilide (0.75μg)
3; Piperacillin Sodium (2.5μg)



NACALAI TESQUE, INC

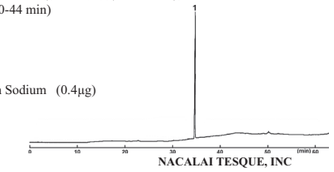
AP-0799

● Piperacillin Sodium

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; Acetonitrile/H_2O/ 200mmol/l KH_2PO_4 = 4/45/1
B; Acetonitrile/H_2O/ 200mmol/l KH_2PO_4 = 25/24/1
B conc. 0%(0-7 min), 0→17%(7→13 min), 17%(13-25 min), 17→80%(25→40min), 80%(40-44 min)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Piperacillin Sodium (0.4μg)



NACALAI TESQUE, INC

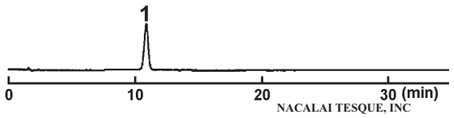
AP-0802

● Pimaricin

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: 0.1%Ammonium Acetate-Methanol/Tetrahydrofuran/H_2O = 44/2/47
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV303nm

Sample: 1; Pimaricin (0.02μg)



NACALAI TESQUE, INC

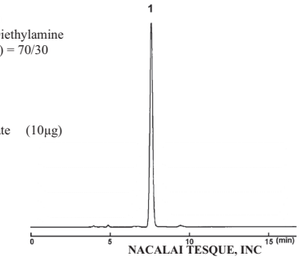
AP-0796

● Vincristine Sulfate

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 1.67% Diethylamine (pH7.5 with H_3PO_4) = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV297nm

Sample: 1; Vincristine Sulfate (10μg)



NACALAI TESQUE, INC

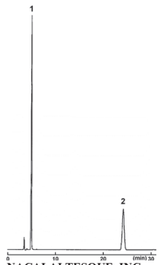
AP-1128

● Famotidine

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/Methanol/ 10mmol/l Sodium *1*-Heptanesulfonate (pH3.0 with Acetic Acid) = 19/3/78
Flow rate: 0.5 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Famotidine (0.5μg)
2; Methyl *p*-Hydroxybenzoate (0.8μg)



NACALAI TESQUE, INC

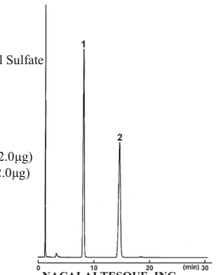
AP-0651

● Scopolamine Butyl Bromide

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 19mmol/l Sodium Lauryl Sulfate = 68/37(pH3.6 with H_3PO_4)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Scopolamine Hydrobromide (2.0μg)
2; Scopolamine *n*-Butyl Bromide(2.0μg)



NACALAI TESQUE, INC

AP-0852

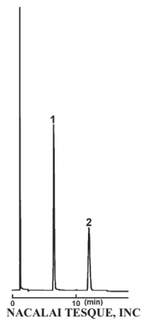
1) Drugs

● Bufexamac

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/Acetonitrile/ 13.6mmol/l Sodium *1*-Octane Sulfonate 0.94%Acetic Acid, 1.9mmol/l EDTA = 24/24/52
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV275nm

Sample: 1; Bufexamac (2μg)
2; Diphenylimidazole (0.16μg)



NACALAI TESQUE, INC

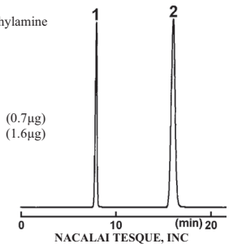
AP-0522

● Pravastatin

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/H_2O/Acetic Acid/Triethylamine = 500/500/1/1
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV238nm

Sample: 1; Ethyl *p*-Hydroxybenzoate (0.7μg)
2; Pravastatin Sodium (1.6μg)



NACALAI TESQUE, INC

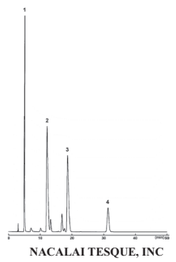
AP-0811

● Flavin Adenine Dinucleotide Sodium

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 0.2%KH_2PO_4 = 20/80
Flow rate: 1.0 ml/min
Temperature: 35°C
Detection: UV260nm

Sample: 1; Adenosine (1.0μg)
2; FAD (4.0μg)
3; FMN (4.0μg)
4; Riboflavin (1.0μg)



NACALAI TESQUE, INC

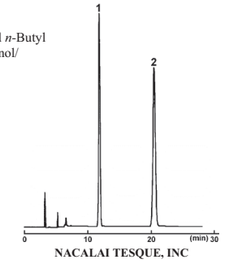
AP-0653

● Fluoxymesterone

COSMOSIL Application Data

Column: 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: *n*-Butyl Chloride/Water-saturated *n*-Butyl Chloride/Tetrahydrofuran/Methanol/ Acetic Acid = 95/95/14/7/6
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Fluoxymesterone (2.7μg)
2; Methyl Prednisolone (2.0μg)



NACALAI TESQUE, INC

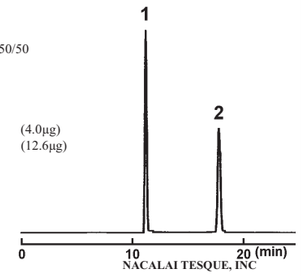
AP-0669

● Fluocinonide

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ H_2O = 50/50
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; Fluocinonide (4.0μg)
2; Propyl Benzoate (12.6μg)



NACALAI TESQUE, INC

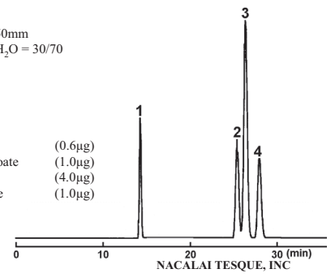
AP-0663

● Fluocinolone Acetonide

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ H_2O = 30/70
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample:
1; Ethyl *p*-Hydroxybenzoate (0.6μg)
2; Isopropyl *p*-Hydroxybenzoate (1.0μg)
3; Fluocinolone Acetonide (4.0μg)
4; Propyl *p*-Hydroxybenzoate (1.0μg)



NACALAI TESQUE, INC

AP-0660

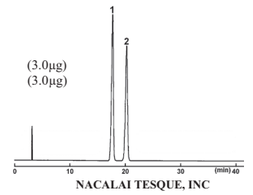
1) Drugs

● Fluocinolone Acetonide

COSMOSIL Application Data

Column: 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Water-saturated Chloroform/Methanol/ Acetic Acid = 200/3/2
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Triamcinolone Acetonide (3.0μg)
2; Fluocinolone Acetonide (3.0μg)



NACALAI TESQUE, INC

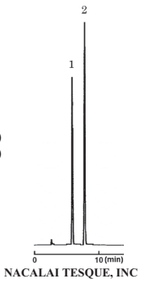
AP-0662

● Fluorometholone

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 35°C
Detection: UV254nm

Sample: 1; Fluorometholone (0.20μg)
2; Butyl *p*-Hydroxybenzoate (0.16μg)



NACALAI TESQUE, INC

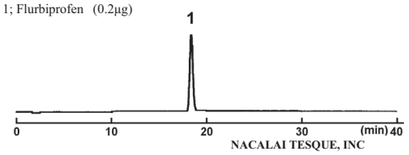
AP-0666

● Flurbiprofen

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 7.7%H_3PO_4 = 35/65
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Flurbiprofen (0.2μg)



NACALAI TESQUE, INC

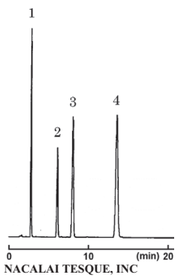
AP-0671

● Prednisolone Acetate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 40/60
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Prednisolone (1.5μg)
2; Prednisolone Acetate (1.0μg)
3; Cortisone Acetate (1.5μg)
4; Butyl *p*-Hydroxybenzoate (0.5μg)



NACALAI TESQUE, INC

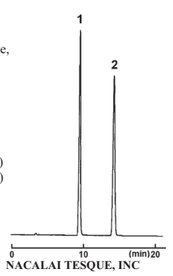
AP-0814

● Procaine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 0.1%Sodium *1*-Pentanesulfonate, 50mmol/l KH_2PO_4(pH3.0 with H_3PO_4) = 20/80
Flow rate: 0.5 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; Procaine Hydrochloride (1.25μg)
2; Caffeine (1.25μg)



NACALAI TESQUE, INC

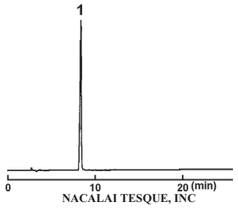
AP-0817

● Procaterol Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 5mmol/l Sodium *1*-Pentanesulfonate/ Acetic Acid = 23/76/1
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample:
1; Procaterol Hydrochloride (0.06μg)



NACALAI TESQUE, INC

AP-0821

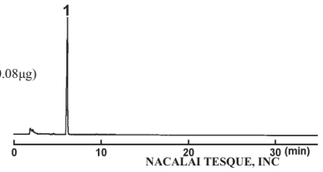
1) Drugs

● Propranolol Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 12mmol/l Sodium Lauryl Sulfate, 0.7mmol/l Tetra-*n*-butylammonium Phosphate/ Sulfuric Acid = 550/450/1(pH3.3 with NaOH)
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV292nm

Sample:
1; Propranolol hydrochloride (0.08μg)



NACALAI TESQUE, INC

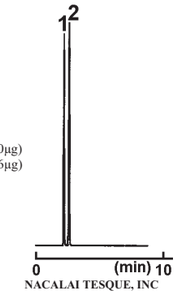
AP-0823

● Flopropione

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 1.2%H_3PO_4 = 57/43
Flow rate: 1.0 ml/min
Temperature: 35°C
Detection: UV267nm

Sample: 1; Flopropione (0.40μg)
2; Ethyl *4*-Hydroxybenzoate (0.26μg)



NACALAI TESQUE, INC

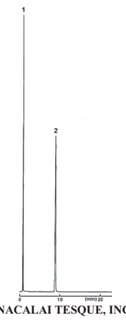
AP-0657

● Bromhexine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 7.3mmol/l KH_2PO_4 (pH7.0 with NaOH) = 80/20
Flow rate: 2.0 ml/min
Temperature: 40°C
Detection: UV245nm

Sample: 1; Bamethane Sulfate (25μg)
2; Bromhexine Hydrochloride (1.25μg)



NACALAI TESQUE, INC

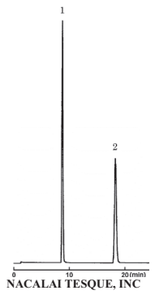
AP-0518

● Beclometasone Dipropionate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Beclometasone Dipropionate (1.6μg)
2; Testosterone Propionate (0.8μg)



NACALAI TESQUE, INC

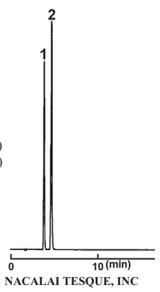
AP-0479

● Bezafibrate

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 0.1%Acetic Acid = 9/4
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV230nm

Sample: 1; *p*-Chlorobenzoic Acid (0.55μg)
2; Bezafibrate (1.05μg)



NACALAI TESQUE, INC

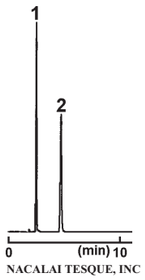
AP-0510

● Bezafibrate

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 0.1%Acetic Acid = 9/4
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV230nm

Sample: 1; *p*-Nitrophenol (0.32μg)
2; Bezafibrate (0.44μg)



NACALAI TESQUE, INC

AP-0513

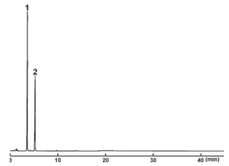
1) Drugs

● Betahistine Mesilate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: 8mmol/l Sodium Lauryl Sulfate-Acetonitrile/ 2%Acetic Acid, 0.5%Diethylamine = 37/63
Flow rate: 1.0 ml/min
Temperature: 35°C
Detection: UV261nm

Sample:
1; *2*-Vinylpyridine (0.16μg)
2; Betahistine Mesilate (0.16μg)



NACALAI TESQUE, INC

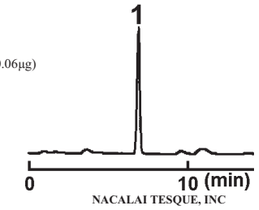
AP-0488

● Betamethasone

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV241nm

Sample: 1; Betamethasone (0.06μg)



NACALAI TESQUE, INC

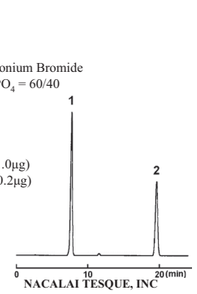
AP-0497

● Betamethasone Sodium Phosphate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol / 5mmol/l Tetra-*n*-butylammonium Bromide 8.9mmol/l Na_2HPO_4,50.7mmol/l KH_2PO_4 = 60/40
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Betamethasone Sodium Phosphate(1.0μg)
2; Butyl *p*-Hydroxybenzoate (0.2μg)



NACALAI TESQUE, INC

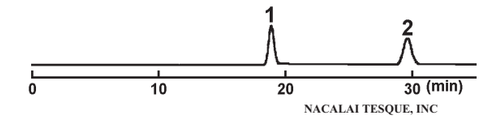
AP-0494

● Betamethasone Valerate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 65/35
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Betamethasone Valerate (1.5μg)
2; Beclometasone Dipropionate (1.5μg)



NACALAI TESQUE, INC

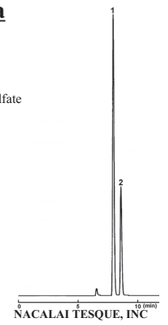
AP-0503

● Berberine Chloride Hydrate

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 6mmol/l Sodium Lauryl Sulfate 25mmol/l KH_2PO_4 = 50/50
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV345nm

Sample: 1; Palmatine Chloride (1.0μg)
2; Berberine Chloride (1.0μg)



NACALAI TESQUE, INC

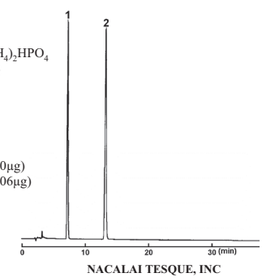
AP-0487

● Benzylpenicillin Potassium

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 50mmol/l $(NH_4)_2HPO_4$ = 24/76 (pH8 with H_3PO_4)
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample:
1; Benzylpenicillin Potassium (4.0μg)
2; Methyl *p*-Hydroxybenzoate (0.06μg)



NACALAI TESQUE, INC

AP-0482

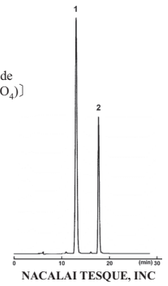
1) Drugs

● Calcium Folinate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: [H_2O/Acetonitrile/Methanol/ 40%Tetra-*n*-butylammonium Hydroxide = 760/200/8.6/9.4 (pH7.5 with NaH_2PO_4)] →1000(with H_2O)
Flow rate: 0.5 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Calcium Folinate (2.8μg)
2; Folic Acid (0.8μg)



NACALAI TESQUE, INC

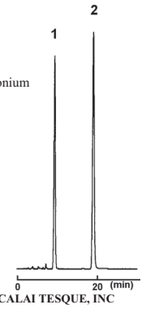
AP-0524

● Calcium Folinate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 8mmol/l Na_2HPO_4/ Tetrabutylammonium Hydroxide = 110/385/4 (pH 7.5 with H_3PO_4)
Flow rate: 1.0 ml/min
Temperature: 45°C
Detection: UV254nm

Sample: 1; Calcium Folinate (2.0μg)
2; Folic Acid (2.0μg)



NACALAI TESQUE, INC

AP-1093

● Mitomycin C

COSMOSIL Application Data

Column: 5PE-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 20mmol/l Ammonium Acetate, 0.025%Acetic Acid = 40/60
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV365nm

Sample: 1; Mitomycin C (5.0μg)
2; Ethyl Vanillin (75μg)

NACALAI TESQUE, INC

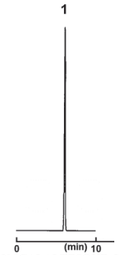
AP-0768

● Mizoribine

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 0.067% H_3PO_4 aq.
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV279nm

Sample: 1; Mizoribine (1.0μg)



NACALAI TESQUE, INC

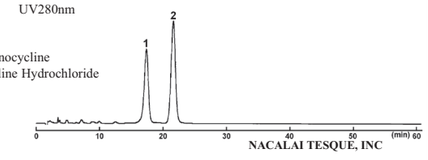
AP-1108

● Minocycline Hydrochloride

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-150mm
Mobile phase: 2.8%Ammonium Oxalate/*N*,*N*-dimethylformamide/ 100mmol/l EDTA = 11/5/4 (pH6.2 with Tetrabutylammonium Hydroxide)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample:
1; *4-epi*-Minocycline
2; Minocycline Hydrochloride



NACALAI TESQUE, INC

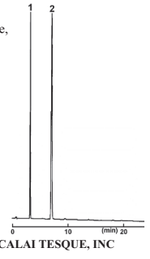
AP-0767

● Mexiletine Hydrochloride

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 14.4mmol/l Sodium Lauryl Sulfate, 25mmol/l NaH_2PO_4 = 21/30
Flow rate: 2.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Phenetylamine Hydrochloride (0.6μg)
2; Mexiletine Hydrochloride (1.0μg)



NACALAI TESQUE, INC

AP-0766

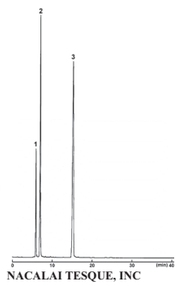
1) Drugs

● Mecobalamin

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 100mmol/l Sodium 1-Hexanesulfonate, Acetonitrile/ 20mmol/l Phosphate buffer(pH3.5) = 20/80
Flow rate: 0.5 ml/min
Temperature: 40°C
Detection: UV266nm

Sample: 1; Cyanocobalamin (0.5μg)
2; Hydroxocobalamin Acetate (0.5μg)
3; Mecobalamin (1.0μg)



NACALAI TESQUE, INC

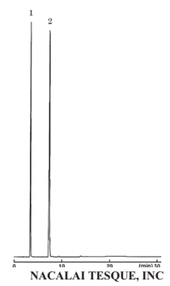
AP-0738

● Meticrane

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 15/85
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV230nm

Sample: 1; Caffeine (0.2μg)
2; Meticrane (0.2μg)



NACALAI TESQUE, INC

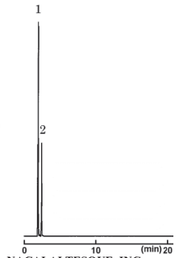
AP-0754

● Meticrane

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 50/50
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV230nm

Sample: 1; Meticrane (0.4μg)
2; Methyl *p*-Hydroxybenzoate (0.4μg)



NACALAI TESQUE, INC

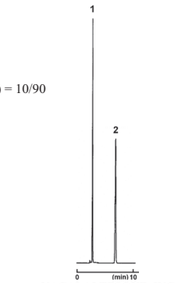
AP-0757

● Methotrexate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 200mmol/l Na_2HPO_4 (pH6.0 with 100mmol/l Citric Acid) = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV302nm

Sample: 1; Folic Acid (1.0μg)
2; Methotrexate (1.0μg)



NACALAI TESQUE, INC

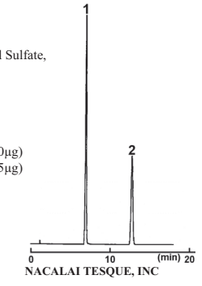
AP-0751

● Metformin Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 4.5mmol/l Sodium Lauryl Sulfate, 0.04%H_3PO_4 = 38/62
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV235nm

Sample: 1; Metformin Hydrochloride (0.50μg)
2; Isobutyl *p*-Hydroxybenzoate (0.95μg)



NACALAI TESQUE, INC

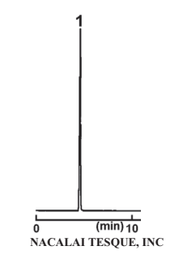
AP-0761

● Metronidazole

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 20/80
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV320nm

Sample: 1; Metronidazole (0.24μg)



NACALAI TESQUE, INC

AP-0763

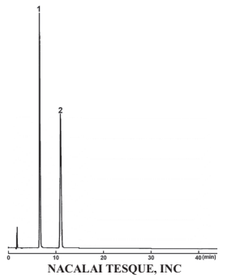
1) Drugs

● Menatetrenone

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV270nm

Sample: 1; Menatetrenone (0.6µg)
2; Phytonadione (0.6µg)



NACALAI TESQUE, INC

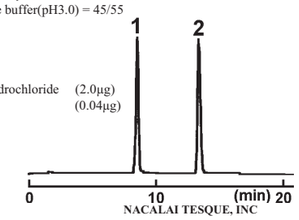
AP-0742

● Mepivacaine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: 10mmol/l Sodium Lauryl Sulfate-Acetonitrile/ 20mmol/l Phosphate buffer(pH3.0) = 45/55
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Mepivacaine Hydrochloride (2.0µg)
2; Benzophenone (0.04µg)



NACALAI TESQUE, INC

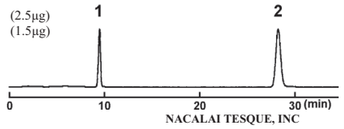
AP-0746

● Meropenem

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 0.1%Triethylamine (pH5.0 with H_3PO_4) = 10/90
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV220nm

Sample:
1; Meropenem Trihydrate (2.5µg)
2; Benzyl Alcohol (1.5µg)



NACALAI TESQUE, INC

AP-0749

● Ubidecarenone

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ Ethanol = 50/50
Flow rate: 0.5 ml/min
Temperature: 35°C
Detection: UV275nm

Sample: 1; Ubidecarenone (2.5µg)

NACALAI TESQUE, INC

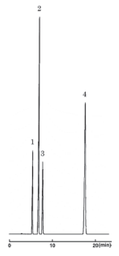
AP-0900

● Iodine, Salicylic Acid and Phenol

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 100mmol/l Phosphate buffer(pH7.0) = 25/75
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV270nm

Sample: 1; Benzoic Acid (2.0µg)
2; Theophylline (0.5µg)
3; Salicylic Acid (2.0µg)
4; Phenol (2.0µg)



NACALAI TESQUE, INC

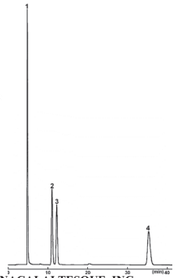
AP-0935

● Latamoxef Sodiums

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 51mmol/l KH_2PO_4, 9mmol/l Na_2HPO_4, 5mmol/l Tetra-*n*-Butylammonium Bromide = 25/75
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample:
1; 5-Mercapto-*1*-methyltetrazole (1.65µg)
2; Latamoxef Sodium (isomer 1)
3; Latamoxef Sodium (isomer 2)
4; *m*-Cresol (7.5µg)



NACALAI TESQUE, INC

AP-0711

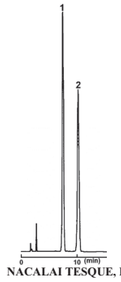
1) Drugs

● Latamoxef Sodiums

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 100mmol/l Ammonium Acetate = 5/95
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Latamoxef Sodium (isomer 1)
2; Latamoxef Sodium (isomer 2)



NACALAI TESQUE, INC

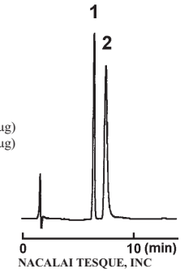
AP-0716

● Liothyronine Sodium

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV220nm

Sample: 1; Propyl *p*-Hydroxybenzoate (0.14µg)
2; Liothyronine Sodium (0.08µg)



NACALAI TESQUE, INC

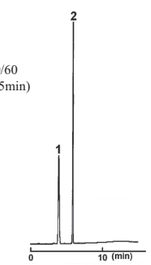
AP-0728

● Lisinopril

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 25mmol/l NaH_2PO_4
B; Acetonitrile/ 25mmol/l NaH_2PO_4 = 40/60
B conc. 10→50%(0→10min), 50%(10-25min)
Flow rate: 1.5 ml/min
Temperature: 60°C
Detection: UV215nm

Sample: 1; Lisinopril (0.45µg)
2; Caffeine (0.015µg)



NACALAI TESQUE, INC

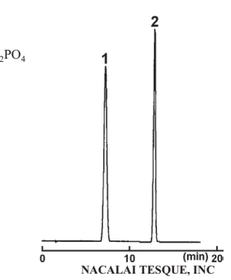
AP-0732

● Lisinopril

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 25mmol/l NaH_2PO_4 = 5/95
Flow rate: 1.0 ml/min
Temperature: 60°C
Detection: UV215nm

Sample: 1; Lisinopril (2.0µg)
2; Caffeine (0.5µg)



NACALAI TESQUE, INC

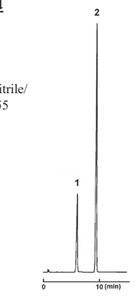
AP-0733

● Lidocaine

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: 10mmol/l Sodium Lauryl Sulfate-Acetonitrile/ 20mmol/l Phosphate buffer(pH3.0) =45/55
Flow rate: 1.5 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Lidocaine (8.5µg)
2; Benzophenone (0.25µg)



NACALAI TESQUE, INC

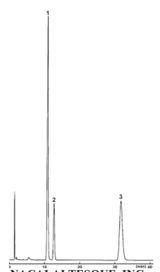
AP-0724

● Ritodrine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 71mmol/l $(NH_4)_2HPO_4$, 7.8mmol/l Sodium *1*-Heptanesulfonate = 30/70(pH3.0 with H_3PO_4)
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV220nm

Sample: 1; Ritodrine Hydrochloride
2; *threo*-Ritodrine Hydrochloride
3; by-product



NACALAI TESQUE, INC

AP-0835

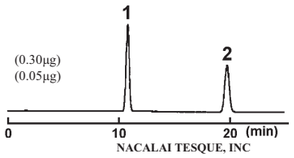
1) Drugs

● Ritodrine Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 71mmol/l $(NH_4)_2HPO_4$, 7.8mmol/l Sodium *1*-Heptanesulfonate = 30/70(pH3.0 with H_3PO_4)
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV274nm

Sample:
1; Ritodrine Hydrochloride (0.30μg)
2; Methyl *p*-Hydroxybenzoate (0.05μg)



NACALAI TESQUE, INC

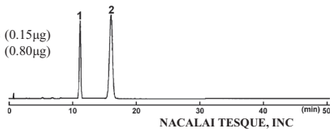
AP-0838

● Rifampicin

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-150mm
Mobile phase: 20mmol/l Citric Acid, 11mmol/l Sodium Perchlorate-Acetonitrile/H_2O/ 1mol/l KH_2PO_4, 55mmol/l H_3PO_4(pH3.1) = 7/11/2
Flow rate: 2.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample:
1; Butyl *p*-Hydroxybenzoate (0.15μg)
2; Rifampicin (0.80μg)



NACALAI TESQUE, INC

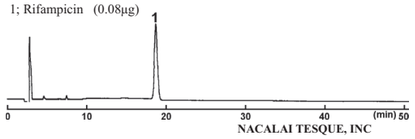
AP-0832

● Rifampicin

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 15mmol/l Sodium Perchlorate, 28mmol/l Citric Acid, 17mmol/l NaH_2PO_4 = 45/55
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV254nm

Sample: 1; Rifampicin (0.08μg)



NACALAI TESQUE, INC

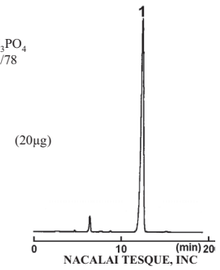
AP-0833

● Lincomycin Hydrochloride

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/Methanol/ 1.35%H_3PO_4 (pH6.0 with Ammonia) = 15/15/78
Flow rate: 1.0 ml/min
Temperature: 46°C
Detection: UV210nm

Sample: 1; Lincomycin Hydrochloride (20μg)



NACALAI TESQUE, INC

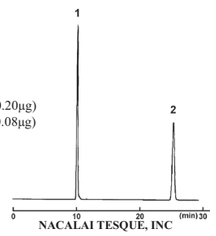
AP-0729

● Reserpine

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 50mmol/l KH_2PO_4 (pH3.0 with H_3PO_4) = 45/55
Flow rate: 0.5 ml/min
Temperature: 40°C
Detection: UV268nm

Sample:
1; Reserpine (0.20μg)
2; Butyl *p*-Hydroxybenzoate (0.08μg)



NACALAI TESQUE, INC

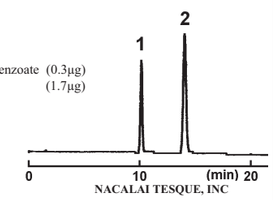
AP-0830

● Levallorphan Tartrate

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 7mmol/l Sodium Lauryl Sulfate, 0.1%H_2PO_4(pH3.0 with NaOH) = 40/60
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV280nm

Sample:
1; *iso*-Butyl *p*-Hydroxybenzoate (0.3μg)
2; Levallorphan Tartrate (1.7μg)



NACALAI TESQUE, INC

AP-0718

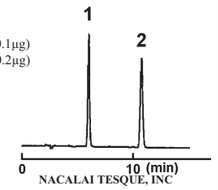
1) Drugs

● Levothyroxine

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 0.15%H_3PO_4 =67/33
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV230nm

Sample:
1; Levothyroxine Sodium (0.1μg)
2; Ethinylestradiol (0.2μg)



NACALAI TESQUE, INC

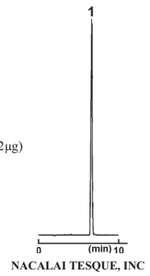
AP-0721

● Roxatidine Acetate Hydrochloride

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O/ Triethylamine/ Acetic Acid = 60/340/2/1
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV274nm

Sample: 1; Roxatidine Acetate Hydrochloride (4.2μg)



NACALAI TESQUE, INC

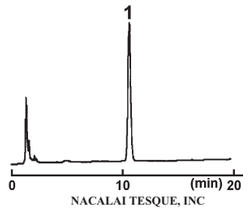
AP-0840

● Roxithromycin

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.2mmol/l $(NH_4)H_2PO_4$ (pH5.3 with NaOH) =30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV205nm

Sample: 1; Roxithromycin (1.0μg)



NACALAI TESQUE, INC

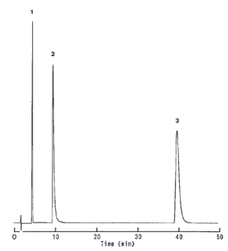
AP-0845

● Tricyclic Drugs

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH7) = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.2AUFS

Sample:
1; Carbamazepine
2; Desipramine Hydrochloride
3; Imipramine Hydrochloride



NACALAI TESQUE, INC

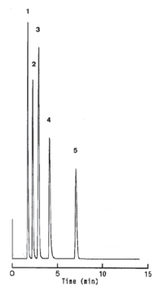
AP-0066

● Bronchodilators

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 1.0AUFS

Sample:
1; Uracil (0.5μg)
2; Theobromine (1.5μg)
3; Theophylline (2.0μg)
4; Caffeine (2.0μg)
5; Phenol (0.8μg)



NACALAI TESQUE, INC

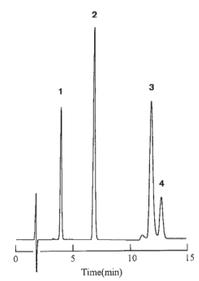
AP-0076

● Antiarrhythmic Drugs

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH7) = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.05AUFS

Sample:
1; Phenytoin
2; Ketamine Hydrochloride
3; Quinidine
4; Lidocaine



NACALAI TESQUE, INC

AP-0067

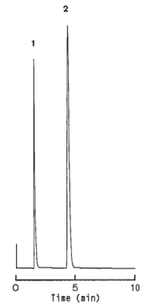
1) Drugs

● Antiarrhythmic Drugs

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH2) = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.2AUFS

Sample:
1; Procainamide (0.5µg)
2; *N*-Acetylprocainamide (0.5µg)



NACALAI TESQUE, INC

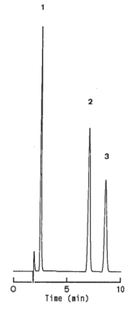
AP-0069

● Antiepileptics

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH7) = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.5AUFS

Sample:
1; Barbital (7.59µg)
2; Phenytoin (10.38µg)
3; Carbamazepine (1.02µg)



NACALAI TESQUE, INC

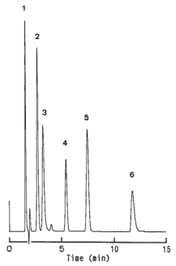
AP-0077

● Analgesics

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / 20mmol/l Phosphoric Acid = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.5AUFS

Sample:
1; Aminoantipyrine (0.74µg)
2; Acetaminophen (2.97µg)
3; Antipyrine (0.85µg)
4; Acetylsalicylic Acid (Aspyrine)
5; Phenacetin (0.54µg)
6; Salicylic acid



NACALAI TESQUE, INC

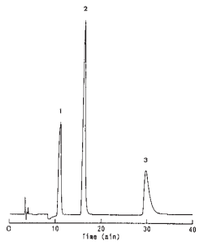
AP-0073

● Analgesics

COSMOSIL Application Data

Column: 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Ethyl Acetate/Hexane =1/1
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.2AUFS

Sample:
1; Acetanilide (1.0µg)
2; Phenacetin (1.0µg)
3; Acetaminophen (1.0µg)



NACALAI TESQUE, INC

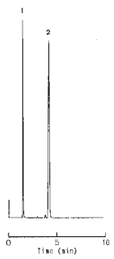
AP-0074

● Histamine H1-Receptor Blockers

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 10mmol/l SDS, 0.1% Phosphoric Acid = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample:
1; Uracil
2; Diphenhydramine Hydrochloride



NACALAI TESQUE, INC

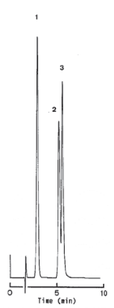
AP-0078

● Histamine H2-Receptor Blockers

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH7) = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.2AUFS

Sample:
1; Famotidine (1.3µg)
2; Cimetidine (33.5µg)
3; Ranitidine (1.6µg)



NACALAI TESQUE, INC

AP-0079

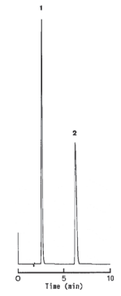
1) Drugs

● Antihyperlipidemic Drugs

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / 20mmol/l Phosphoric Acid = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.5AUFS

Sample:
1; Hydralazine Hydrochloride (1.0µg)
2; Todralazine Hydrochloride (1.0µg)



NACALAI TESQUE, INC

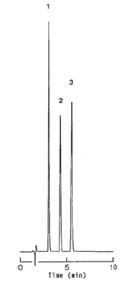
AP-0080

● Profens

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 20mmol/l Acetic Acid = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 1.0AUFS

Sample:
1; Ketoprofen (1.60µg)
2; Ibuprofen (1.69µg)
3; Flurbiprofen (1.57µg)



NACALAI TESQUE, INC

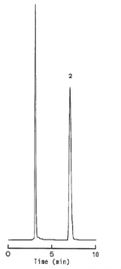
AP-0081

● Cardiac Glycosides

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV230nm, 0.32AUFS

Sample:
1; Digitoxigenin (2.5µg)
2; Digitoxin (5.0µg)



NACALAI TESQUE, INC

AP-0083

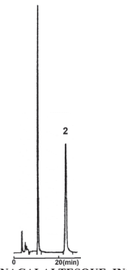
● Anticancer Drugs

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/H_2O = 80/20
Flow rate: 0.3 ml/min
Temperature: Room temperature
Detection: UV226nm

Sample:
1; *cis*-Platin (CDDP) (1.46µg)
2; Guanosine (0.50µg)

データ提供
北陸大学 薬学部
小藤恭子 先生



NACALAI TESQUE, INC

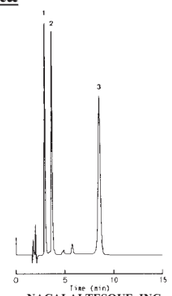
AP-0380

● Tetracyclines Antibiotics

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH3) = 20/80
Flow rate: 1.0 ml/min
Temperature: 20°C
Detection: UV254nm

Sample:
1; Oxytetracycline
2; Tetracycline
3; Chlortetracycline



NACALAI TESQUE, INC

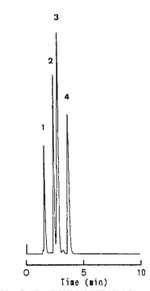
AP-0085

● Penicillin Antibiotics

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH7) = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV235nm, 0.2AUFS

Sample:
1; Carbenicillin (1.5µg)
2; Ampicillin (3.0µg)
3; Methicillin Sodium Salt (1.5µg)
4; Penicillin G Potassium Salt (3.0µg)



NACALAI TESQUE, INC

AP-0086

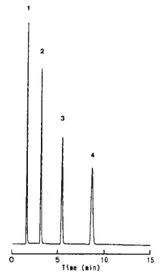
1) Drugs

● Quinolone Antimicrobials

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH3) = 55/45
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV270nm, 0.16AUFS

Sample: 1; Ofloxacin (0.39µg)
2; Oxolinic Acid (0.08µg)
3; Flumequine (1.08µg)
4; Piromidic Acid (0.08µg)



NACALAI TESQUE, INC

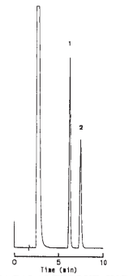
AP-0087

● Nitrofuran Antimicrobials

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / 20mmol/l Phosphoric Acid = 20/80
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm, 0.5AUFS

Sample: 1; Nitrofurantoin (1.0µg)
2; Nitrofurazone (1.0µg)



NACALAI TESQUE, INC

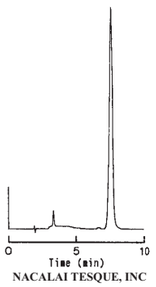
AP-0089

● Streptomycin Sulfate

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 5mmol/l Sodium *1*-Hexanesulfonate, 20mmol/l KH_2PO_4 = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV205nm, 0.2AUFS

Sample: Streptomycin Sulfate (5.0µg)



NACALAI TESQUE, INC

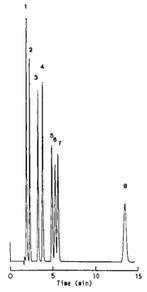
AP-0091

● Sulfa Drugs

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / 20mmol/l Phosphoric Acid = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV230nm, 0.5AUFS

Sample: 1; Sulfaisomidin (0.24µg)
2; Sulfathiazole (0.24µg)
3; Sulfamethazine (0.24µg)
4; Sulfamethoxypyridazine (0.24µg)
5; Sulfamethoxazole (0.24µg)
6; Sulfachloropyridazine (0.24µg)
7; Sulfamonomethoxine (0.24µg)
8; Sulfadimethoxine (0.24µg)



NACALAI TESQUE, INC

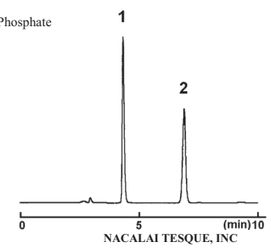
AP-0090

● Allantoin

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 10mmol/l Phosphate buffer(pH7.0) = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Allantoin
2; Allantoic Acid



NACALAI TESQUE, INC

AP-1060

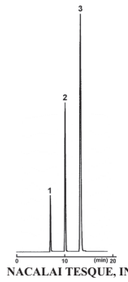
2) Crude Drugs

● Bearberry Leaf

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 1mmol/l HCl = 5/95
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: 1; Arbutin (5.0µg)
2; Hydroquinone (5.0µg)
3; Gallic Acid (5.0µg)



NACALAI TESQUE, INC

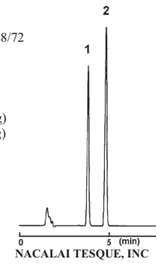
AP-0906

● Scutellaria Root

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.68% Phosphoric Acid = 28/72
Flow rate: 1.0 ml/min
Temperature: 50°C
Detection: UV277nm

Sample: 1; Baicalin (0.1µg)
2; Methyl p-Hydroxybenzoate (0.2µg)



NACALAI TESQUE, INC

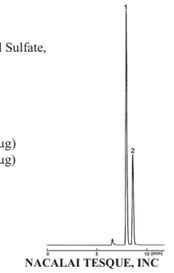
AP-1134

● Phellodendron Bark

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 5.9mmol/l Sodium Lauryl Sulfate, 25mmol/l KH_2PO_4 = 50/50
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV345nm

Sample: 1; Palmatine Chloride Hydrate (1.0µg)
2; Berberine Chloride (1.0µg)



NACALAI TESQUE, INC

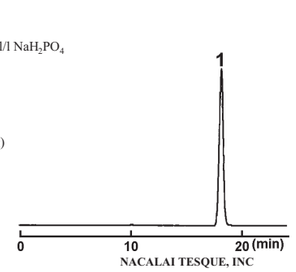
AP-0964

● Pueraria Root

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 50mmol/l NaH_2PO_4 = 10/90
Flow rate: 0.5 ml/min
Temperature: 40°C
Detection: UV250nm

Sample: 1; Puerarin (1.3µg)



NACALAI TESQUE, INC

AP-0969

● Kamishoyosan Extract

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.11%H_3PO_4 = 10/90
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV240nm

Sample: 1; Geniposide (1.2µg)

NACALAI TESQUE, INC

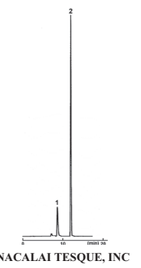
AP-0942

● Glycyrrhiza

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 2%H_3PO_4 = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Glycyrrhizic Acid (5.0µg)
2; Propyl *p*-Hydroxybenzoate (1.0µg)



NACALAI TESQUE, INC

AP-0927

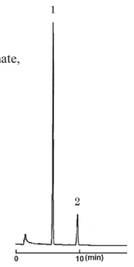
2) Crude Drugs

● Dried Yeast

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 9.2mmol/l Sodium *1*-Octanesulfonate, 20mmol/l KH_2PO_4(pH3.5 with H_3PO_4) = 20/80
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; Thiamine Hydrochloride (0.10µg)
2; Phenacetin (0.06µg)



NACALAI TESQUE, INC

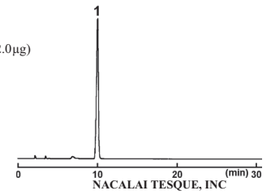
AP-0919

● Keishibukuryougan Extract

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 50mmol/l NaH_2PO_4 = 1/5
Flow rate: 0.8 ml/min
Temperature: 45°C
Detection: UV210nm

Sample: 1; *D*-(-)-Amygdalin (2.0µg)



NACALAI TESQUE, INC

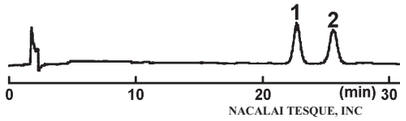
AP-0944

● Red Ginseng and Ginseng

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 20/80
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV203nm

Sample: 1; Ginsenoside Rg1 (2.5µg)
2; Ginsenoside Re (2.5µg)



NACALAI TESQUE, INC

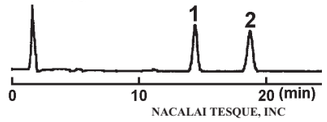
AP-0922

● Red Ginseng and Ginseng

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 30/70
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV203nm

Sample: 1; Ginsenoside Rb1 (2.5µg)
2; Ginsenoside Rc (2.5µg)



NACALAI TESQUE, INC

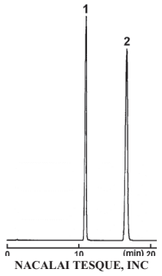
AP-0923

● Magnolia Bark

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 2%Acetic Acid = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV289nm

Sample: 1; Honokiol (1.0µg)
2; Magnolol (1.0µg)



NACALAI TESQUE, INC

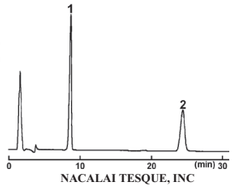
AP-0948

● Bupleurum Root

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 40/60
Flow rate: 1.0 ml/min
Temperature: 50°C
Detection: UV206nm

Sample: 1; Saikosaponin a (1.0µg)
2; Saikosaponin d (1.0µg)



NACALAI TESQUE, INC

AP-0910

2) Crude Drugs

● Saireito Extract

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 50mmol/l NaH_2PO_4 = 3/5
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; Saikosaponin b2 (1.0µg)

NACALAI TESQUE, INC

AP-0978

● Saireito Extract

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.5%H_3PO_4 = 24/76
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV277nm

Sample: 1; Baicalin (0.5µg)

NACALAI TESQUE, INC

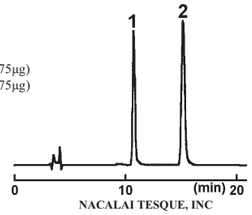
AP-0981

● Powdered Gardenia Fruit

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 60/440
Flow rate: 0.5 ml/min
Temperature: 30°C
Detection: UV240nm

Sample: 1; Caffeine (0.175µg)
2; Geniposide (0.175µg)



NACALAI TESQUE, INC

AP-0966

● Peony Root

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.12%H_3PO_4 =15/85
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV232nm

Sample: 1; Albiflorin (1.0µg)
2; Paeoniflorin (1.0µg)

NACALAI TESQUE, INC

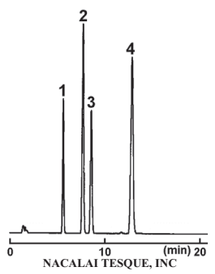
AP-0960

● Toad Venom

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.1%H_3PO_4 = 45/55
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV300nm

Sample:
1; Bufalin (0.4µg)
2; Cinobufagin (0.4µg)
3; Resibufogenin (0.6µg)
4; Indometacin(Indomethacin) (0.6µg)



NACALAI TESQUE, INC

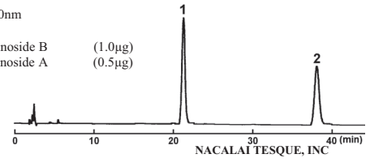
AP-1000

● Senna Leaf

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: 5mmol/l Tetra-*n*-heptylammonium Bromide-Acetonitrile/ 0.1mol/l Acetic Acid, 1%Sodium Acetate(pH5.0) = 32/68
Flow rate: 1.0 ml/min
Temperature: 50°C
Detection: UV340nm

Sample: 1; Sennoside B (1.0µg)
2; Sennoside A (0.5µg)



NACALAI TESQUE, INC

AP-0993

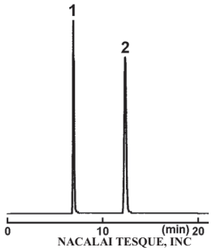
2) Crude Drugs

● Swertia Herb

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 10/90
Flow rate: 0.5 ml/min
Temperature: 50°C
Detection: UV238nm

Sample: 1; Theophylline (1.0µg)
2; Swertiamarin (1.0µg)



NACALAI TESQUE, INC

AP-0996

● Rhubarb

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 1.25%Acetic Acid = 20/80
Flow rate: 0.5 ml/min
Temperature: 40°C
Detection: UV340nm

Sample: 1; Sennoside A (2.0µg)
2; Naringin (2.0µg)

NACALAI TESQUE, INC

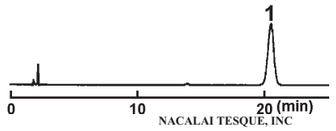
AP-0972

● Daiokanzoto Extract

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.04%H_3PO_4 = 540/2460
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV340nm

Sample: 1; Sennoside A (0.26µg)



NACALAI TESQUE, INC

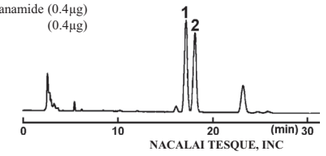
AP-0916

● Capsicum

COSMOSIL Application Data

Column: 5PE-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 0.1%H_3PO_4 = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV281nm

Sample: 1; Vanillylnonanamide (0.4µg)
2; Capsaicin (0.4µg)



NACALAI TESQUE, INC

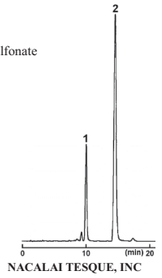
AP-0913

● Ipecac

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Sodium *1*-Heptanesulfonate (pH4.0 with Acetic Acid) = 50/50
Flow rate: 1.0 ml/min
Temperature: 50°C
Detection: UV283nm

Sample: 1; Cephaeline Hydrobromide (2.0µg)
2; Emetine Hydrochloride (0.5µg)



NACALAI TESQUE, INC

AP-0938

● Belladonna Root

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 50mmol/l KH_2PO_4, 1%Triethylamine(pH3.5 with H_3PO_4) = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Atropine Sulfate (2.0µg)
2; Brucine Dihydrate (0.5µg)

NACALAI TESQUE, INC

AP-0909

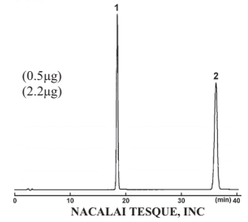
2) Crude Drugs

● Moutan Bark

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 3.1%Acetic Acid = 35/65
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV274nm

Sample: 1; Paeonol (0.5µg)
2; Butyl *p*-Hydroxybenzoate (2.2µg)



NACALAI TESQUE, INC

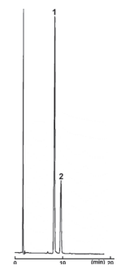
AP-0950

● Hochuekkito Extract

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 1.2%H_3PO_4 = 18/82
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV285nm

Sample: 1; Naringin (0.1µg)
2; Hesperidin (0.1µg)



NACALAI TESQUE, INC

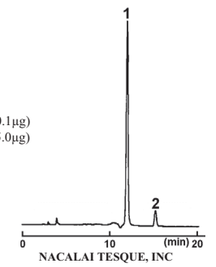
AP-0930

● Povidone

COSMOSIL Application Data

Column: $5C_8$-MS
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ H_2O = 20/80
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; *1*-Vinyl-*2*-pyrrolidone (0.1µg)
2; Vinyl Acetate (5.0µg)



NACALAI TESQUE, INC

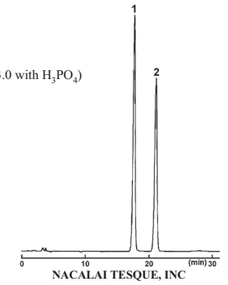
AP-0965

● Nux Vomica

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 50mmol/l KH_2PO_4, 1.11%Triethylamine = 10/90(pH3.0 with H_3PO_4)
Flow rate: 0.5 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Strychnine (0.8µg)
2; Barbital Sodium (1.1µg)



NACALAI TESQUE, INC

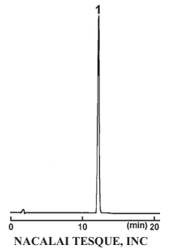
AP-0958

● Ryokeijutukanto Extract

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.13%H_3PO_4 = 25/75
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV273nm

Sample: 1; *trans*-Cinnamic Acid (0.1µg)



NACALAI TESQUE, INC

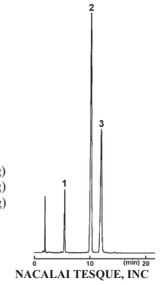
AP-0976

● Scopolia Rhizome and Scopolia Extract

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 50mmol/l KH_2PO_4, 0.1%Triethylamine(pH3.5 with H_3PO_4) = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Scopolamine Hydrobromide (0.6µg)
2; Atropine Sulfate (2.0µg)
3; Brucine Dihydrate (0.4µg)



NACALAI TESQUE, INC

AP-0989

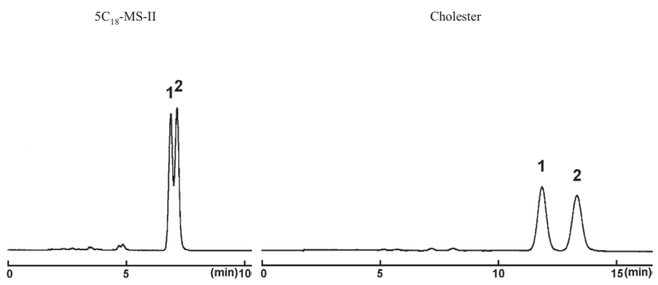
3) Natural Compounds

● Carotenes

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Tetrahydrofuran/Methanol = 20/80
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV470nm

Sample: 1; α-Carotene
2; β-Carotene



NACALAI TESQUE, INC

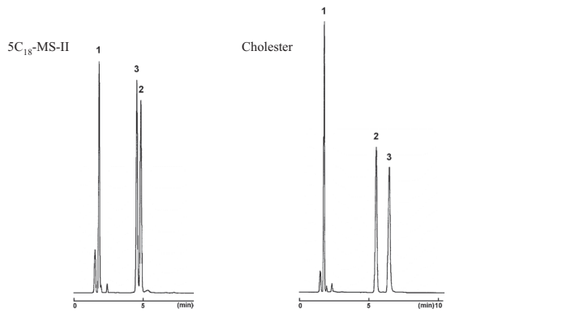
AP-1031

● Flavanones

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 20mmol/l Phosphate buffer(pH2.5) = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: 1; Naringin (0.4µg)
2; Naringenin (0.2µg)
3; Apigenin (0.2µg)



NACALAI TESQUE, INC

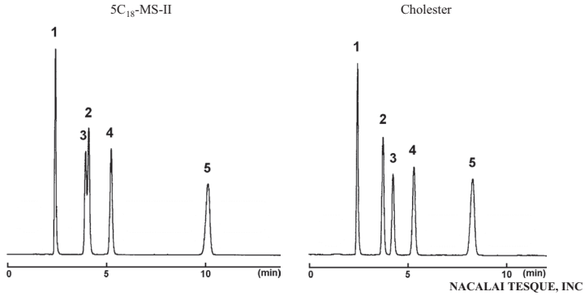
AP-1033

● Saikosaponins

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 45/55
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD, Gain=6

Sample: 1; Saikosaponin c (1.5µg)
2; Saikosaponin a (1.5µg)
3; Saikosaponin b_2 (1.5µg)
4; Saikosaponin b_1 (1.5µg)
5; Saikosaponin d (1.5µg)



NACALAI TESQUE, INC

AP-1021

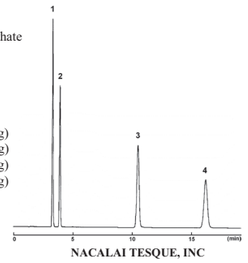
3) Natural Compounds

● Hydroxyflavones

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile / 20mmol/l Phosphate buffer(pH2.5) = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: 1; 7-Hydroxyflavone (0.2µg)
2; 6-Hydroxyflavone (0.1µg)
3; 3-Hydroxyflavone (0.5µg)
4; 5-Hydroxyflavone (0.1µg)



NACALAI TESQUE, INC

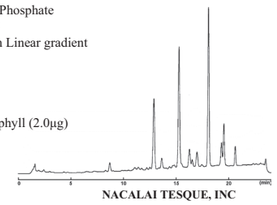
AP-0245

● Chlorophyll

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A: Methanol/ 20mmol/l Phosphate buffer(pH7.0) = 60/40
B: Methanol/ 20mmol/l Phosphate buffer(pH7.0) = 95/5
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV405nm

Sample: Sodium Copper Chlorophyll (2.0µg)



NACALAI TESQUE, INC

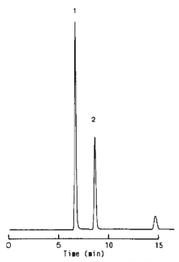
AP-0249

● Coumarins

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / H_2O = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.16AUFS

Sample: 1; Coumarin (0.84µg)
2; Dihydrocoumarin (3.86µg)



NACALAI TESQUE, INC

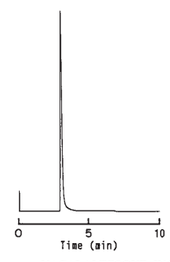
AP-0124

● Hinokitiol

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 1mmol/l EDTA, 20mmol/l Phophoric Acid = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.5AUFS

Sample: Hinokitiol (1.0µg)



NACALAI TESQUE, INC

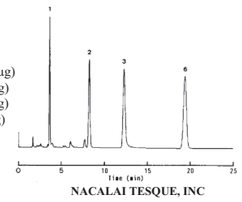
AP-0393

● Anthraquinone dyes

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH3) = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.16AUFS

Sample: 1; Alizalin (0.05µg)
2; Chrysazin (0.1µg)
3; Anthrarufin (0.3µg)
6; Amylbenzene (10µg)



NACALAI TESQUE, INC

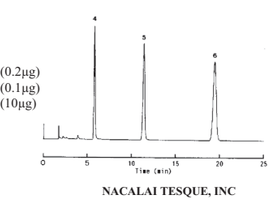
AP-0131

● Anthraquinone dyes

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH3) = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.16AUFS

Sample: 4; Purpurin (0.2µg)
5; Quinizarin (0.1µg)
6; Amylbenzene (10µg)



NACALAI TESQUE, INC

AP-0132

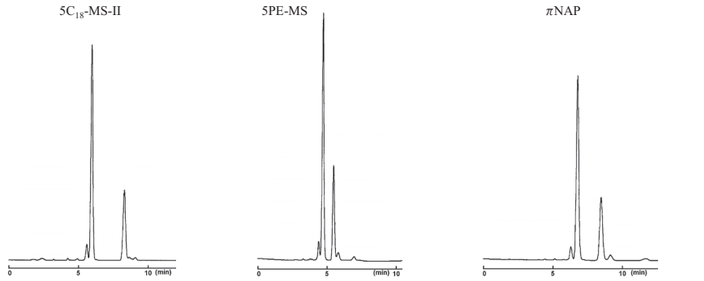
3) Natural Compounds

● Capsaicin

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: Capsaicin (2.0μg)



NACALAI TESQUE, INC

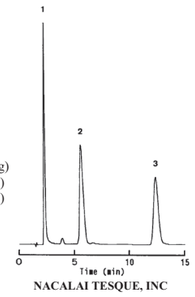
AP-1034

● Alkaloids

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH3) = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Papaverine Hydrochloride (0.17μg)
2; Aconitine (8.1μg)
3; Reserpine (1.7μg)



NACALAI TESQUE, INC

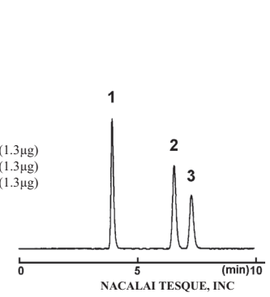
AP-0133

● Ginkgo Biloba

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample: 1; Ginkgolide C (1.3μg)
2; Ginkgolide A (1.3μg)
3; Ginkgolide B (1.3μg)



NACALAI TESQUE, INC

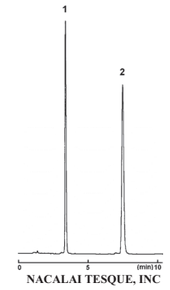
AP-1063

● Zingiberis Rhizoma

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV225nm

Sample: 1; *6*-Gingerol (0.31μg)
2; *6*-Shogaol (0.13μg)



NACALAI TESQUE, INC

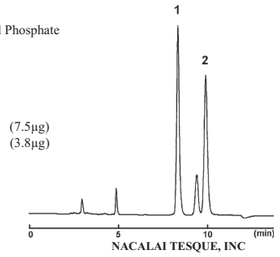
AP-1016

● Watermelon

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 20mmol/l Phosphate buffer(pH7.0) = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; *L*-Citrulline (7.5μg)
2; Malic Acid (3.8μg)



NACALAI TESQUE, INC

AP-1062

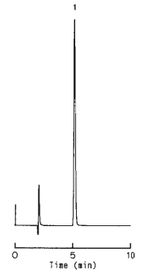
4) Pesticides

● Asulam

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 50mmol/l Phosphate buffer(pH3) = 15/85
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV270nm

Sample: Asulam



NACALAI TESQUE, INC

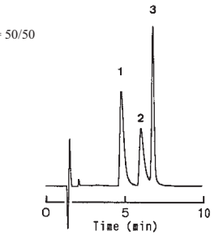
AP-0144

● Chlorophenoxyacetic Herbicides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 0.1%Acetic Acid = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV275nm, 0.02AUFS

Sample: 1; MCP (0.22μg)
2; MCPP (0.20μg)
3; MCPB (0.24μg)



NACALAI TESQUE, INC

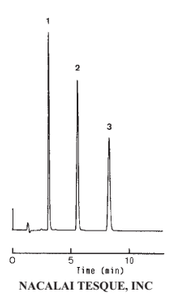
AP-0147

● Pesticides used at Golf Course

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 50mmol/l Phosphate buffer(pH3) = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV230nm

Sample: 1; Thiram
2; Iprodione
3; Bensulide



NACALAI TESQUE, INC

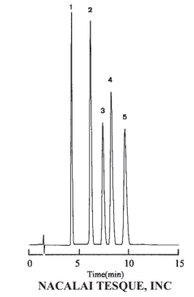
AP-0145

● Diphenyl Ether Herbicides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.1AUFS

Sample: 1; Fluorodifen (0.6μg)
2; Chlomethoxynil (1.0μg)
3; Nitrofen (1.0μg)
4; Oxyfluorfen (1.2μg)
5; CNP (1.0μg)



NACALAI TESQUE, INC

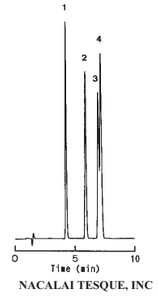
AP-0146

● Aniline Herbicides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.1AUFS

Sample: 1; DCMU (0.11μg)
2; DCPA (0.08μg)
3; Linuron (0.11μg)
4; MCC (0.18μg)



NACALAI TESQUE, INC

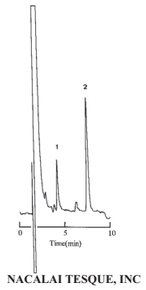
AP-0148

● Dithiocarbamate Herbicides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 20mmol/l KH_2PO_4 = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; Maneb (60μg)
2; Thiram (10μg)



NACALAI TESQUE, INC

AP-0149

4) Pesticides

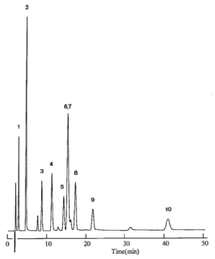
● Carbamate Herbicides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.05AUFS

Sample:

1; Methomyl	(0.5μg)	
2; Pirimicarb	(0.5μg)	
3; MTMC	(2.0μg)	
4; PHC	(2.0μg)	
5; MPMC	(2.0μg)	
6; NAC	(1.0μg)	
7; XMC	(1.0μg)	
8; Ethiofencarb	(2.0μg)	
9; Isoprocarb	(2.0μg)	
10; BPMC	(2.0μg)	



NACALAI TESQUE, INC

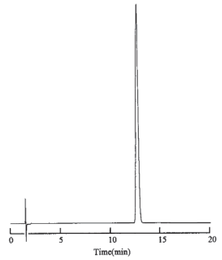
AP-0150

● Carbamate Herbicides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.05AUFS

Sample: Carbosulfan (6.0μg)



NACALAI TESQUE, INC

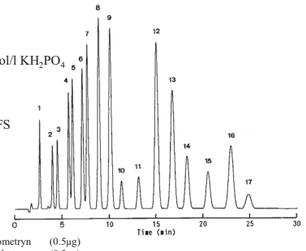
AP-0151

● Triazine and Urea Herbicides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 20mmol/l KH_2PO_4 = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.2AUFS
Sample:

1; PAC	(0.5μg)	14; Prometryn	(0.5μg)
2; Bromacil	(0.5μg)	15; Terbutryn	(0.5μg)
3; CAT	(0.5μg)	16; Chloro IPC	(2.5μg)
4; Methabenzthiazuron	(0.5μg)	17; Ethofumesate	(5.0μg)
5; Chlorotoluron	(0.5μg)		
6; Isoproturon	(0.5μg)		
7; Monolinuron	(0.5μg)		
8; Metabromuron	(0.5μg)		
9; Dimefuron	(0.5μg)		
10; Propazine	(0.5μg)		
11; Terbutylazine	(0.5μg)		
12; Linuron	(0.5μg)		
13; Chloroxuron	(0.5μg)		



NACALAI TESQUE, INC

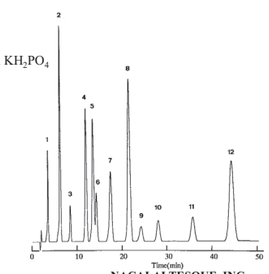
AP-0152

● Triazine and Urea Herbicides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 20mmol/l KH_2PO_4 = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.2AUFS
Sample:

1; Ethidimuron	(1.0μg)
2; Metoxuron	(1.0μg)
3; Cyanazine	(1.0μg)
4; Methabenzthiazuron	(1.0μg)
5; Chlorotoluron	(1.0μg)
6; Atrazine	(1.0μg)
7; Isoproturon	(1.0μg)
8; Metabromuron	(1.0μg)
9; Metazachlor	(5.0μg)
10; Propazine	(1.0μg)
11; Terbutylazine	(1.0μg)
12; Linuron	(1.0μg)



NACALAI TESQUE, INC

AP-0153

5) Food Additives

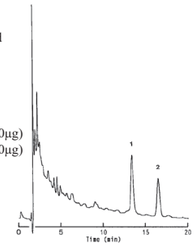
● Natural Colorants (Chlorophyll)

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / 20mmol/l Phosphoric Acid = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.02AUFS

Sample:

1; Sodium Copper Chlorophyllin	(30μg)
2; Sodium Iron Chlorophyllin	(30μg)



NACALAI TESQUE, INC

AP-0095

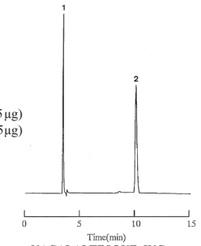
● Natural Colorants (Carotenoid)

COSMOSIL Application Data

Column: 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Chloroform/Hexane = 1/9
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.16AUFS

Sample:

1; β-Carotene	(0.5μg)
2; *all-trans*-Retinol Acetate	(1.5μg)



NACALAI TESQUE, INC

AP-0094

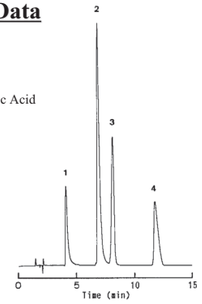
● Synthetic Sweeteners

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile / 20mmol/l Phosphoric Acid = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm, 1.0AUFS

Sample:

1; Acesulfame K	(1.0μg)
2; Saccharin	(1.0μg)
3; Diketopiperazine	(1.0μg)
4; Aspartame	(1.0μg)



NACALAI TESQUE, INC

AP-0107

● Synthetic Colorants

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; Methanol/ 20mmol Phosphate buffer(pH7) = 10/90
B; Methanol/ 20mmol Phosphate buffer(pH7) = 80/20
B conc. 15→100% Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.64AUFS
Sample:

1; Tartrazine(黄色4号)	(1.0μg)	7; Brilliant Blue FCF(青色1号)	(3.0μg)
2; Amaranth(赤色2号)	(1.0μg)	8; Acid Red(赤色106号)	(1.0μg)
3; Indigo Carmine(青色2号)	(1.0μg)	9; Erythrosine(赤色3号)	(1.0μg)
4; New Coccine(赤色102号)	(1.0μg)	10; Phloxine(赤色104号)	(1.0μg)
5; Sunset Yellow FCF(黄色5号)	(1.0μg)	11; Rose Bengale(赤色105号)	(1.0μg)
6; Fast Green FCF(緑色3号)	(3.0μg)		

NACALAI TESQUE, INC

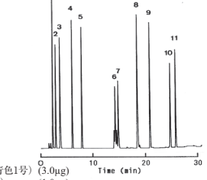
AP-0093

● Synthetic Colorants

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; Methanol/ 20mmol Phosphate buffer(pH7) = 10/90
B; Methanol/ 20mmol Phosphate buffer(pH7) = 80/20
B conc. 15→100% Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.64AUFS
Sample:

1; Tartrazine(黄色4号)	(1.0μg)	7; Brilliant Blue FCF(青色1号)	(3.0μg)
2; Amaranth(赤色2号)	(1.0μg)	8; Acid Red(赤色106号)	(1.0μg)
3; Indigo Carmine(青色2号)	(1.0μg)	9; Erythrosine(赤色3号)	(1.0μg)
4; New Coccine(赤色102号)	(1.0μg)	10; Phloxine(赤色104号)	(1.0μg)
5; Sunset Yellow FCF(黄色5号)	(1.0μg)	11; Rose Bengale(赤色105号)	(1.0μg)
6; Fast Green FCF(緑色3号)	(3.0μg)		



NACALAI TESQUE, INC

AP-0092

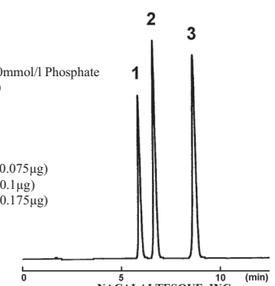
● Food Preservatives

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/Methanol/ 20mmol/l Phosphate buffer(pH4.0) = 20/10/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV230nm

Sample:

1; Benzoic Acid	(0.075μg)
2; Sorbic Acid	(0.1μg)
3; Dehydroacetic Acid	(0.175μg)



NACALAI TESQUE, INC

AP-0378

5) Food Additives

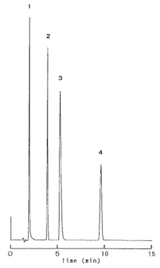
● Preservatives (Fungicides)

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV230nm, 0.5AUFS

Sample:

1; Thiabendazole	(0.3μg)
2; *o*-Phenylphenol	(0.3μg)
3; Imazalil	(2.1μg)
4; Diphenyl	(0.3μg)



NACALAI TESQUE, INC

AP-0097

● Glycyrrhizic Acid

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile / (Acetic Acid/H_2O=1/15) = 2/3
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.64AUFS

Sample:

1; Glycyrrhizic Acid	(5.0μg)
2; Propyl *p*-Hydroxybenzoate	(1.0μg)

NACALAI TESQUE, INC

AP-0109

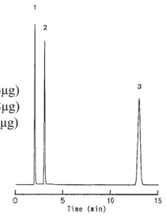
● Antioxidants

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / H_2O = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm, 0.16AUFS

Sample:

1; *2-tert*-Butylhydroquinone	(0.56μg)
2; *3-tert*-Butyl-*4*-hydroxyanisol	(0.58μg)
3; *2,6*-Di-*tert*-butyl-*4*-hydroxytoluene	(1.85μg)



NACALAI TESQUE, INC

AP-0100

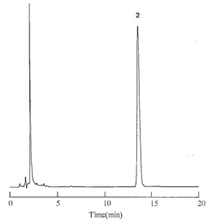
● Antioxidants

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / H_2O = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.32AUFS

Sample:

1; Propyl Gallate	(1.0μg)
2; Rthoxyquin	(1.0μg)



NACALAI TESQUE, INC

AP-0101

● Repellents

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / H_2O = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.32AUFS

Sample: Piperonyl Butoxide (10μg)

NACALAI TESQUE, INC

AP-0104

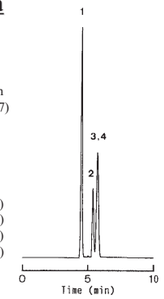
● Umami Seasonings (Nucleic Acids)

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ 5mmol/l Tributylammonium bromide, 20mmol/l Phosphate buffer(pH7) = 5/95
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV270nm, 0.32AUFS

Sample:

1; Sodium 5′-Cytidylate	(1.0μg)
2; Sodium 5′-Uridylate	(1.0μg)
3; Sodium 5′-Guanylate	(1.0μg)
4; Sodium 5′-Inosinate	(1.0μg)



NACALAI TESQUE, INC

AP-0106

6) Vitamins

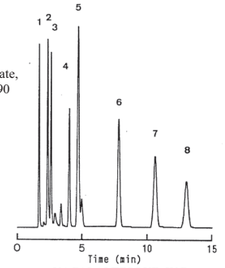
● Hydrosoluble Vitamins

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile / 5mmol/l Sodium *1*-Hexanesulfonate, 20mmol/l Phosphoric Acid = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm, 0.16AUFS

Sample:

1; Vitamin C	(0.23μg)
2; Niacin	(0.057μg)
3; Nicotinamide	(0.042μg)
4; Vitamin B_6	(0.040μg)
5; Riboflavin Phosphate Sodium Salt	(0.19μg)
6; Vitamin B_1 Hydrochloride	(0.19μg)
7; Folic Acid	(0.084μg)
8; Vitamin B_2	(0.57μg)



NACALAI TESQUE, INC

AP-0059

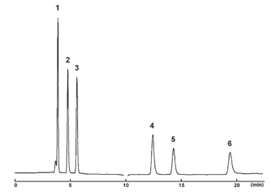
● Hydrosoluble Vitamins

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 100mmol/l Ammonium Acetate = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample:

1; Nicotinamide	(0.125μg)
2; Pyridoxine(Vitamin B_6)	(0.25μg)
3; Riboflavin (Vitamin B_2)	(0.25μg)
4; Nicotinic Acid	(0.125μg)
5; *D*-Pantothenic Acid	(3.125μg)
6; *L(+)*-Ascorbic Acid	(0.875μg)



NACALAI TESQUE, INC

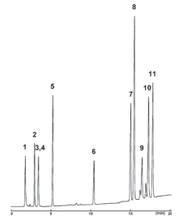
AP-0315

● Water-soluble Vitamins

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 20mmol/l Phosphate buffer(pH2.5)
B; Methanol/ 20mmol/l Phosphate buffer(pH2.5) = 60/40
B conc. 0→80% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm
Sample:

1; Vitamin B_1 Hydrochloride	(0.17μg)
2; *L-(+)*-Ascorbic Acid	(0.33μg)
3; Nicotinic Acid	(0.03μg)
4; Nicotinamide	(0.05μg)
5; Pyridoxine Hydrochloride	(0.27μg)
6; *D*-Pantothenic Acid Sodium Salt	(2.01μg)
7; Vitamin B_{12}	(0.20μg)
8; Folic Acid	(0.26μg)
9; *D*-Biotin〔Vitamin H〕	(2.02μg)
10; Flavin Mononucleotide Sodium Salt	(0.26μg)
11; Vitamin B_2〔Riboflavin〕	(0.13μg)



NACALAI TESQUE, INC

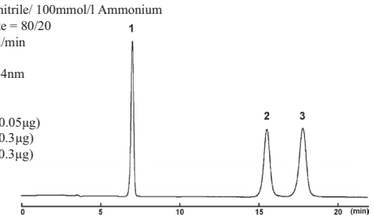
AP-1055

● Ascorbic Acids

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 100mmol/l Ammonium Acetate = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample:
1; Sorbic Acid (0.05μg)
2; Isoascorbic Acid (0.3μg)
3; Ascorbic Acid (0.3μg)



NACALAI TESQUE, INC

AP-0318

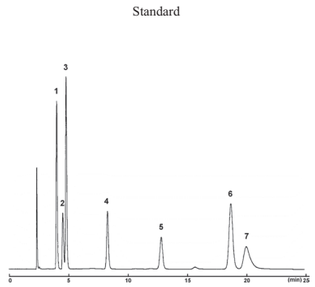
● Energy Drink

COSMOSIL Application Data

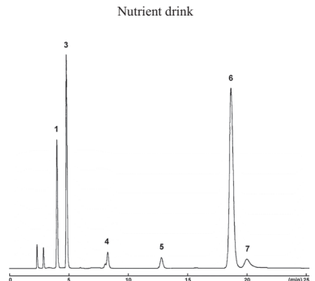
Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 5mmol/l Sodium *1*-Hexanesulfonate, 20mmol/l Phosphoric Acid = 15/85
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample:		Standard
	1; Citric Acid	(10mg/ml)
	2; Carnitine	(20mg/ml)
	3; Nicotinamide	(0.2mg/ml)
	4; Vitamin B_6	(0.2mg/ml)
	5; Vitamin B_1	(0.2mg/ml)
	6; Caffeine	(0.2mg/ml)
	7; Riboflavin Phosphate	(0.2mg/ml)
Injection Vol.	1.0μl	

Standard



Nutrient drink



NACALAI TESQUE, INC

AP-1048

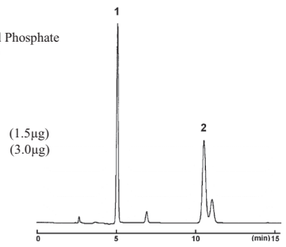
6) Vitamins

● Fruit Juice

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 10mmol/l Phosphate buffer(pH7.0) = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Ascorbic Acid (1.5µg)
2; Malic Acid (3.0µg)



NACALAI TESQUE, INC

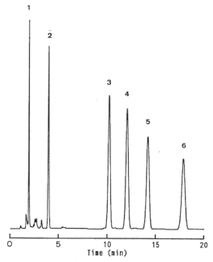
AP-0313

● Fat-soluble Vitamins

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/Methanol = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm, 0.64AUFS

Sample: 1; Vitamin K_3 (1.71µg)
2; Vitamin A Acetate (0.44µg)
3; Vitamin D_3 (0.57µg)
4; Vitamin E (4.97µg)
5; Vitamin E Acetate (4.79µg)
6; Vitamin K_1 (1.68µg)



NACALAI TESQUE, INC

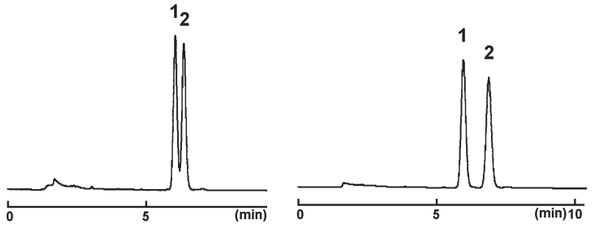
AP-0060

● Vitamin D

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV265nm

Sample: 1; Vitamin D_2 (0.3µg)
2; Vitamin D_3 (0.1µg)



NACALAI TESQUE, INC

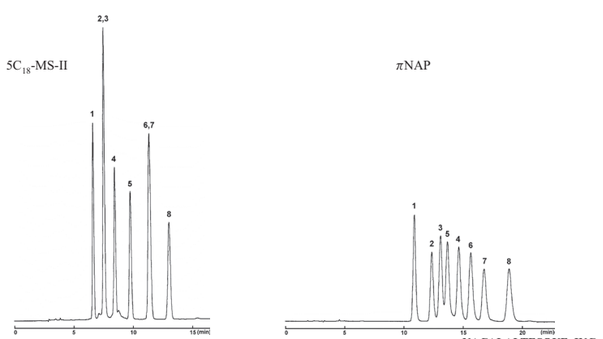
AP-1035

● Vitamin E

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: $5C_{18}$-MS-II Methanol
πNAP Methanol/ H_2O = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV295nm

Sample: 1; δ-Tocotrienol
2; γ-Tocotrienol
3; β-Tocotrienol
4; α-Tocotrienol
5; δ-Tocopherol
6; γ-Tocopherol
7; β-Tocopherol
8; α-Tocopherol



NACALAI TESQUE, INC

AP-1071

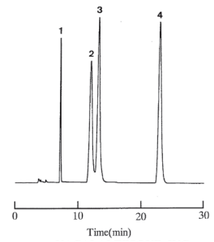
6) Vitamins

● Tocopherols

COSMOSIL Application Data

Column: 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: *n*-Hexane/2-Propanol = 99.5/0.5
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm, 0.16AUFS

Sample: 1; α-Tocopherol (3.0µg)
2; β-Tocopherol (7.5µg)
3; γ-Tocopherol (7.5µg)
4; δ-Tocopherol (7.5µg)



NACALAI TESQUE, INC

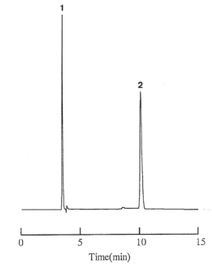
AP-0061

● Vitamin A

COSMOSIL Application Data

Column: 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: *n*-Hexane/Chloroform = 9/1
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.16AUFS

Sample: 1; β-Carotene (0.5µg)
2; Vitamin A (1.5µg)



NACALAI TESQUE, INC

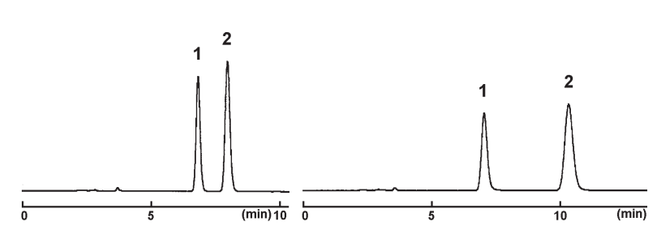
AP-0062

● Vitamin A Acid

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / 20mmol/l Phosphate buffer(pH2.5) = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV350nm

Sample: 1; *13-cis*-Retinoic Acid (0.04µg)
2; *all-trans*-Retinoic Acid (0.04µg)



NACALAI TESQUE, INC

AP-1036

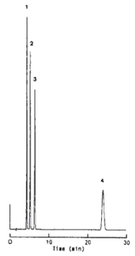
7) Metabolites

● Androgens

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV235nm, 0.5AUFS

Sample:
1; *4*-Androstene-*3,17*-dione (1.0μg)
2; Testosterone (1.0μg)
3; *17*-Methyltestosterone (1.0μg)
4; Testosterone Propionate (1.0μg)



NACALAI TESQUE, INC

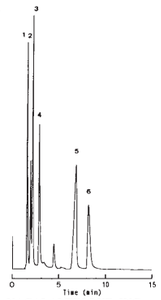
AP-0111

● Catecholamines

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: 20mmol/l NaH_2PO_4
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV270nm, 0.1AUFS

Sample:
1; Norepinephrine (1.0μg)
2; Epinephrine (1.2μg)
3; *L*-DOPA (1.2μg)
4; Dopamine (1.0μg)
5; *3,4*-Dihydroxyphenylacetic Acid (1.0μg)
6; *3*-Methoxytyramine (1.0μg)



NACALAI TESQUE, INC

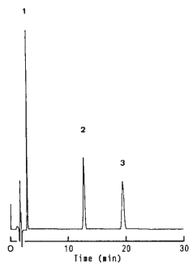
AP-0120

● Estrogens

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 35/65
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm, 0.2AUFS

Sample:
1; Estriol (1.5μg)
2; Estradiol (1.5μg)
3; Estrone (1.5μg)



NACALAI TESQUE, INC

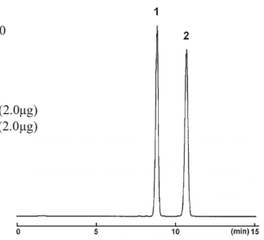
AP-0114

● Estradiols

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample:
1; *17-β*-Estradiol (2.0μg)
2; *17-α*-Estradiol (2.0μg)



NACALAI TESQUE, INC

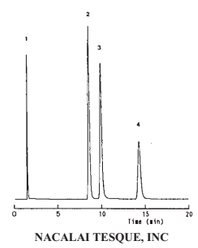
AP-0243

● Hippuric Acids

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH3) = 15/85
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV225nm, 0.32AUFS

Sample:
1; Creatinine (0.14μg)
2; Mandelic Acid (1.89μg)
3; Hippuric Acid (0.61μg)
4; *o*-Methyl Hippuric Acid (0.52μg)



NACALAI TESQUE, INC

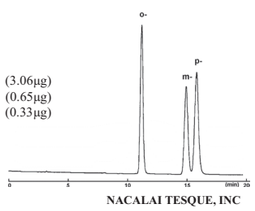
AP-0112

● Methylhippuric Acids

COSMOSIL Application Data

Column: 5PYE
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH2.5) = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample:
N-(*o*-Toluoyl) glycine (3.06μg)
N-(*m*-Toluoyl) glycine (0.65μg)
N-(*p*-Toluoyl) glycine (0.33μg)



NACALAI TESQUE, INC

AP-0289

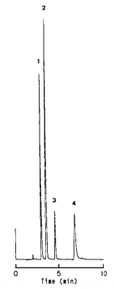
7) Metabolites

● Urate Metabolites

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: 20mmol/l Phosphoric Acid
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm, 0.1AUFS

Sample:
1; Hypoxanthine (0.9μg)
2; Uric Acid (18.3μg)
3; Xanthine (9.0μg)
4; Allopurinol (1.8μg)



NACALAI TESQUE, INC

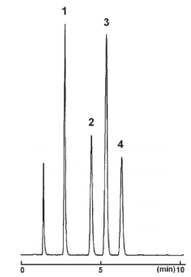
AP-0117

● Prostaglandins

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: 0.05%TFA-40%Acetonitrile
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample:
1; Prostaglandin I_2 (2.0μg)
2; Prostaglandin $F_{2\alpha}$ (2.0μg)
3; Prostaglandin E_2 (2.0μg)
4; Prostaglandin D_2 (2.0μg)



NACALAI TESQUE, INC

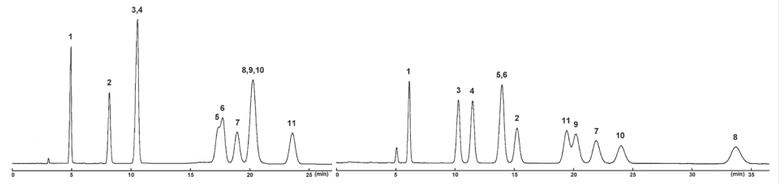
AP-0247

● Adrenal Cortical Hormones

COSMOSIL Application Data

Column: $5C_{18}$-MS-II / πNAP
Column size: 4.6mmI.D.-150mm
Mobile phase: $5C_{18}$-MS-II Methanol/ H_2O = 50/50
πNAP Methanol/ H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample:
1; Triamcinolone
2; Cortisone
3; Prednisolone
4; Hydrocortisone
5; Betamethasone
6; Dexamethasone
7; Triamcinolone Acetonide
8; Cortisone Acetate
9; Prednisolone Acetate
10; Fluocinolone Acetonide
11; Fluorometholone (each 0.23μg)



NACALAI TESQUE, INC

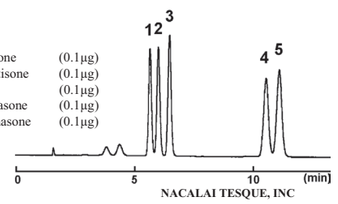
AP-1037

● Adrenal Cortical Hormones

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV240nm

Sample:
1; Prednisolone (0.1μg)
2; Hydrocortisone (0.1μg)
3; Cortisone (0.1μg)
4; Betamethasone (0.1μg)
5; Dexamethasone (0.1μg)



NACALAI TESQUE, INC

AP-0233

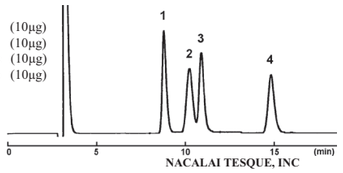
8) Carbohydrates

● Oligosaccharides

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; Sucrose (10µg)
2; Maltose (10µg)
3; Trehalose (10µg)
4; Raffinose (10µg)



NACALAI TESQUE, INC

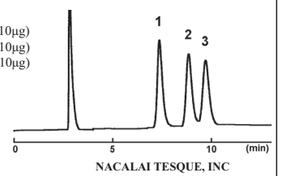
AP-0335

● Cyclodextrins

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 65/35
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; α-Cyclodextrin (10µg)
2; β-Cyclodextrin (10µg)
3; γ-Cyclodextrin (10µg)



NACALAI TESQUE, INC

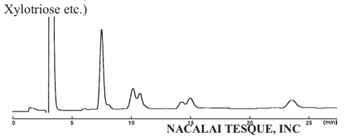
AP-0336

● Xylooligosaccharides

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: Xylooligosaccharides (50µg)
(Xylobiose, Xylotriose etc.)



NACALAI TESQUE, INC

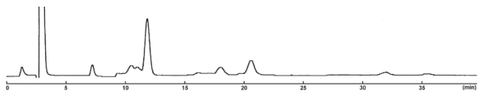
AP-0321

● Isomaltooligosaccharides

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: Isomaltooligosaccharides (50µg)
(Isomaltose, Isomaltotriose, Panose etc.)



NACALAI TESQUE, INC

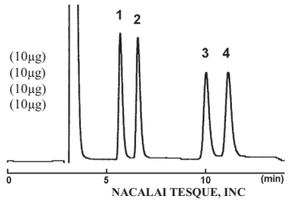
AP-0322

● Anticarious Foods Components

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; *meso*-Erythritol (10µg)
2; Xylitol (10µg)
3; Palatinose (10µg)
4; Maltitol (10µg)



NACALAI TESQUE, INC

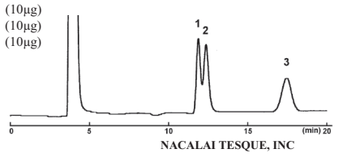
AP-0323

● Infusion Solution Components

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 85/15
Flow rate: 1.0 ml/min
Temperature: 50°C
Detection: RI

Sample: 1; Xylitol (10µg)
2; Fructose (10µg)
3; Glucose (10µg)



NACALAI TESQUE, INC

AP-0328

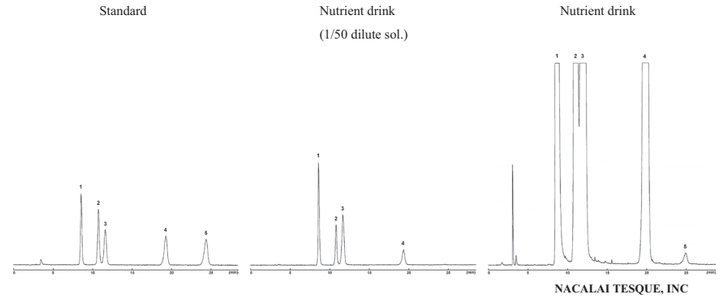
8) Carbohydrates

● Energy Drink

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ H_2O = 85/15
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: ELSD

		Standard
Sample:	1; Fructose	(1.0mg/ml)
	2; Glucose	(1.0mg/ml)
	3; Glucitol(Sorbitol)	(1.0mg/ml)
	4; Sucrose	(1.0mg/ml)
	5; Inositol	(1.0mg/ml)
Injection Vol.	5.0µl	



NACALAI TESQUE, INC

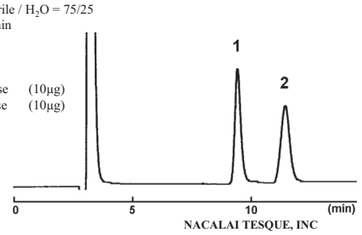
AP-1049

● Chocolate Components

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; Sucrose (10µg)
2; Lactose (10µg)



NACALAI TESQUE, INC

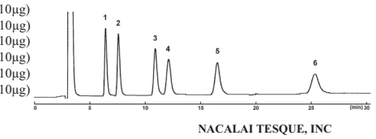
AP-0324

● Gum Components

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample:
1; Xylitol (10µg)
2; Mannitol (10µg)
3; Maltitol (10µg)
4; Palatinit (10µg)
5; Maltotriitol (10µg)
6; Maltotetraitol (10µg)



NACALAI TESQUE, INC

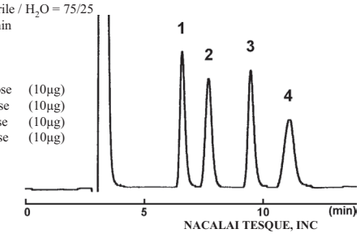
AP-0325

● Cold Beverage Components

COSMOSIL Application Data

Column: Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; Fructose (10µg)
2; Glucose (10µg)
3; Sucrose (10µg)
4; Maltose (10µg)



NACALAI TESQUE, INC

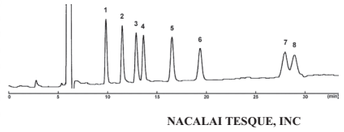
AP-0326

● Sports Drink Components

COSMOSIL Application Data

Column: Sugar-D
Column size: (4.6mmI.D.-250mm) ×2
Mobile phase: Acetonitrile / H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 50°C
Detection: RI

Sample:
1; *meso*-Erythritol (10µg)
2; Fructose (10µg)
3; Glucitol (10µg)
4; Glucose (10µg)
5; Sucrose (10µg)
6; Maltose (10µg)
7; Maltotriitol (10µg)
8; Maltotriose (10µg)



NACALAI TESQUE, INC

AP-0327

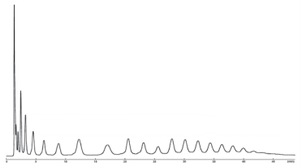
8) Carbohydrates

● PA-Glucose Oligomer

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: A: 20mmol/l Acetate buffer(pH3.3)
B: 20mmol/l Acetate buffer(pH3.3)+0.5%Butanol
B(0→100%) 45min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: FLS at Ex.320nm
Em. 400nm

Sample:
PA-Glucose Oligomer(DP=3-22)



NACALAI TESQUE, INC

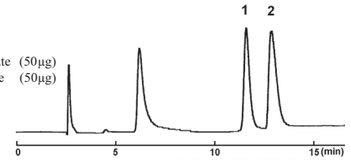
AP-0379

● Phosphorylated Sugars

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 20mmol/l Phosphate buffer(pH7.0) = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample:
1; *D*-Fructose-*6*-phosphate (50μg)
2; *D*-Glucose-*6*-phosphate (50μg)



NACALAI TESQUE, INC

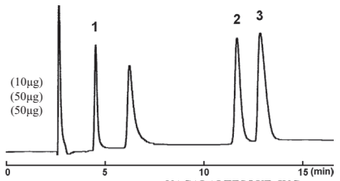
AP-0317

● Phosphorylated Sugars

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 20mmol/l Phosphate buffer(pH7.0) = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample:
1; Glucose (10μg)
2; *α*-D-Glucose-*1*-phosphate (50μg)
3; D-Glucose-*6*-phosphate (50μg)



NACALAI TESQUE, INC

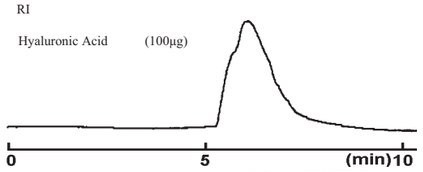
AP-0314

● Hyaluronic Acid

COSMOSIL Application Data

Column: CNT-1000
Column size: 7.5mmI.D.-300mm
Mobile phase: 20mmol/l Phosphate buffer(pH7),100mmol/l Na_2SO_4
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: Hyaluronic Acid (100μg)



NACALAI TESQUE, INC

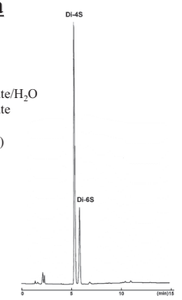
AP-1081

● Enzyme digests of Chondroitin Sulfate A

COSMOSIL Application Data

Column: Cholester
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 1mmol/l Tetrabutylammonium bisulfate/H_2O
B; 1mmol/l Tetrabutylammonium bisulfate -Acetonitrile/H_2O=67/33
B conc. 20%→65%(7min)→65%(12min)
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV240nm

Sample: Chondroitin Sulfate A
Chondroitinase AC-II digested



NACALAI TESQUE, INC

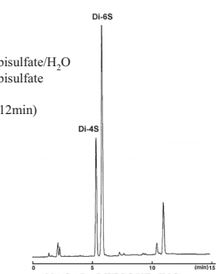
AP-1082

● Enzyme digests of Chondroitin Sulfate A

COSMOSIL Application Data

Column: Cholester
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 1mmol/l Tetrabutylammonium bisulfate/H_2O
B; 1mmol/l Tetrabutylammonium bisulfate -Acetonitrile/H_2O=67/33
B conc. 20%→65%(7min)→65%(12min)
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV240nm

Sample: Chondroitin Sulfate C
Chodrotinase AC-II digested



NACALAI TESQUE, INC

AP-1083

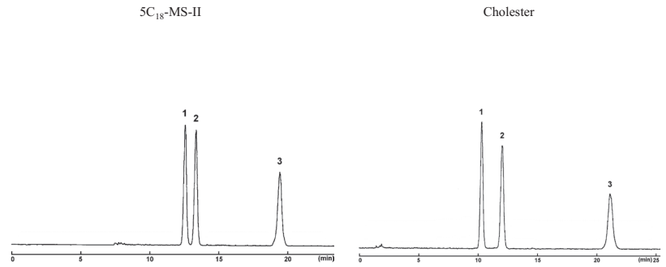
9) Lipids

● Fatty Acids

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: 0.05%TFA-90%Methanol
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample: 1; Oleic Acid (3.0μg)
2; Elaidic Acid (3.0μg)
3; Stearic Acid (3.0μg)



NACALAI TESQUE, INC

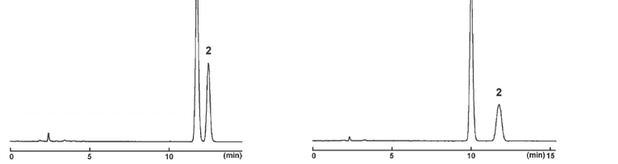
AP-1038

● Fatty Acids

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: 0.05%TFA-90%Methanol
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample: 1; *cis*-Vaccenic Acid (3.0μg)
2; *trans*-Vaccenic Acid (3.0μg)



NACALAI TESQUE, INC

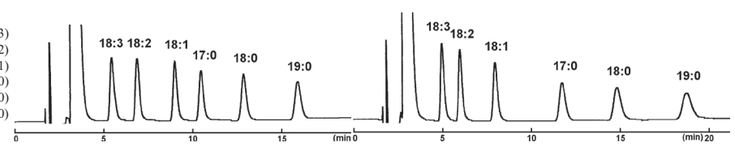
AP-1039

● Methylated Fatty Acids

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 95/5
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: Methyl Linolenate (18:3)
Methyl Linoleate (18:2)
Methyl Oleate (18:1)
Methyl Margarate (17:0)
Methyl Stearate (18:0)
Methyl *n*-Nonadecanoate (19:0)
(each 10μg)



NACALAI TESQUE, INC

AP-1040

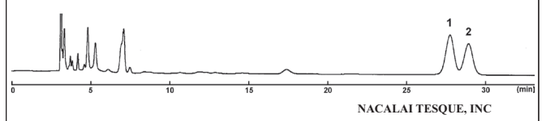
9) Lipids

● Fatty Acid Derivatives

COSMOSIL Application Data

Column: Cholester
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ H_2O = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Linolenic Acid *p*-Bromophenacyl Ester
2; γ-Linolenic Acid *p*-Bromophenacyl Ester



NACALAI TESQUE, INC

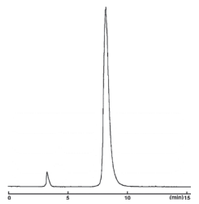
AP-0211

● Phosphatides

COSMOSIL Application Data

Column: 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: 0.05%TFA-Methanol
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample: *L*-α-Phosphatidyl Choline (10μg)



NACALAI TESQUE, INC

AP-0250

● Phosphatides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: 0.05%TFA-10%THF/90%Methanol
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample: *L*-α-Phosphatidyl Choline (2.0μg)

NACALAI TESQUE, INC

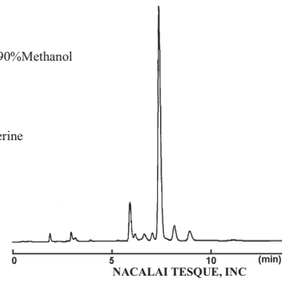
AP-0251

● Phosphatides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: 0.05%TFA-10%THF/90%Methanol
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample: *L*-α-Phosphatidyl-L-serine



NACALAI TESQUE, INC

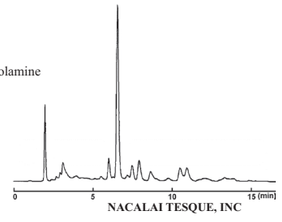
AP-0252

● Phosphatides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: 0.05%TFA-10%THF/90%Methanol
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample: *L*-α-Phosphatidylethanolamine (8.0μg)



NACALAI TESQUE, INC

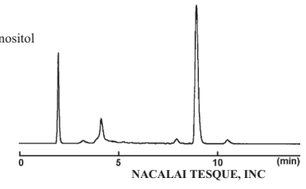
AP-0253

● Phosphatides

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-250mm
Mobile phase: 0.05%TFA-10%THF/90%Methanol
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample: *L*-α-Phosphatidylinositol Sodium Salt



NACALAI TESQUE, INC

AP-0254

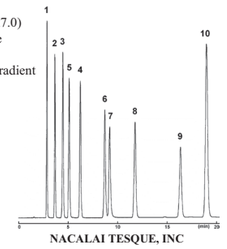
10) Nucleic Acid Related Substances

● Nucleobases and Nucleosides

COSMOSIL Application Data

Column: πNAP
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 20mmol/l Phosphate buffer(pH7.0)
B; Methanol/ 20mmol/l Phosphate buffer(pH7.0) = 10/90
B conc. 0→100% 15min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm
Sample:

1; Cytosine	(0.16μg)
2; Uracil	(0.06μg)
3; Cytidine	(0.32μg)
4; Uridine	(0.24μg)
5; Guanine	(0.16μg)
6; Thymine	(0.16μg)
7; Adenine	(0.08μg)
8; Guanosine	(0.24μg)
9; Thymidine	(0.24μg)
10; Adenosine	(0.16μg)



NACALAI TESQUE, INC

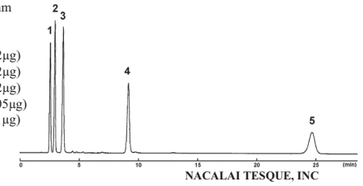
AP-1052

● Nucleobases, Nucleosides and Nucleotides

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-150mm
Mobile phase: 20mmol/l Phosphate buffer(pH7)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm
Sample:

1; 5′-ATP	(0.2μg)
2; 5′-ADP	(0.2μg)
3; 5′-AMP	(0.2μg)
4; Adenine	(0.05μg)
5; Adenosine	(0.1μg)



NACALAI TESQUE, INC

AP-0376

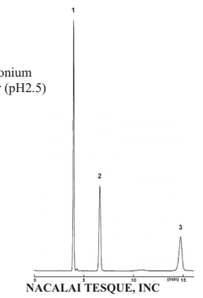
● Nucleotides

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 5mmol/l Tetra-*n*-butylammonium Phosphate, 20mmol/l Phosphate buffer (pH2.5) = 20/80
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm

Sample:

1; 5′-AMP	(0.33μg)
2; 5′-ADP	(0.33μg)
3; 5′-ATP	(0.33μg)



NACALAI TESQUE, INC

AP-0377

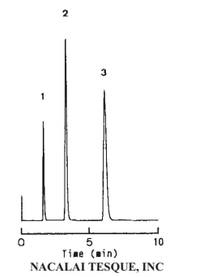
● Nucleotides

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: 20mmol/l Phosphate buffer(pH7)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.5AUFS

Sample:

1; *d*CMP	(1.0μg)
2; *d*GMP	(1.2μg)
3; *d*AMP	(1.0μg)



NACALAI TESQUE, INC

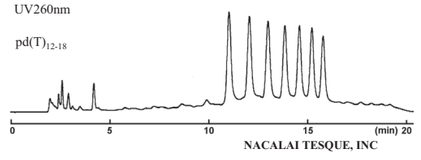
AP-0115

● DNA Oligomer

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 100mmol/l Ammonium Acetate
B; Acetonitrile
B conc. 9→11% 15min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm

Sample: $pd(T)_{12-18}$



NACALAI TESQUE, INC

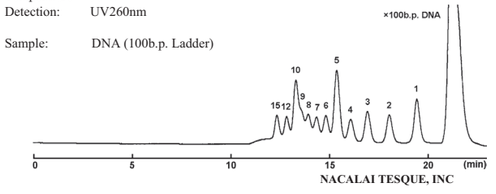
AP-1064

● DNA Ladder

COSMOSIL Application Data

Column: CNT-1000 + CNT-2000
Column size: 7.5mmI.D.-300mm × 2
Mobile phase: 20mmol/l Phosphate buffer(pH7),100mmol/l Na_2SO_4
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm

Sample: DNA (100b.p. Ladder)



NACALAI TESQUE, INC

AP-1078

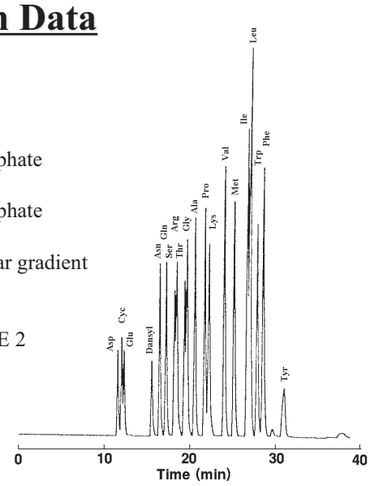
11) Amino Acids, Peptides and Proteins

● Dansyl Amino Acids

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; Acetonitrile/ 20mmol Phosphate buffer(pH7.0) =10/90
B; Acetonitrile/ 20mmol Phosphate buffer(pH7.0) =40/60
B conc. 0→100% 30min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: Ex.365nm Em.530nm RANGE 2

Sample: Dansyl Amino Acids (1.0µg each)



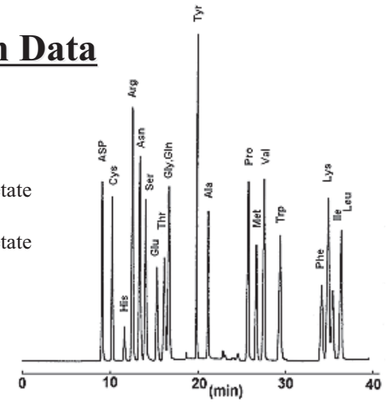
NACALAI TESQUE, INC

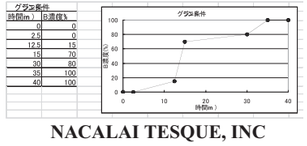
AP-0003

● PTH-Amino Acids

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; Acetonitrile/ 20mmol/l Acetate buffer(pH4.8) =10/90
B; Acetonitrile/ 20mmol/l Acetate buffer(pH4.8) =50/50
Step wise gradient
Flow rate: 1.0 ml/min
Temperature: 60°C
Detection: UV270nm, 0.16AUFS
Sample: PTH-Asp (0.4mg/ml)
PTH-His (0.3mg/ml)
PTH-Arg (0.5mg/ml)
PTH-Ser (0.3mg/ml)
PTH-Trp (0.25mg/ml)
PTH-Lys (0.35mg/ml)
Others (0.2mg/ml)
Injection 2.0µl





NACALAI TESQUE, INC

AP-0004

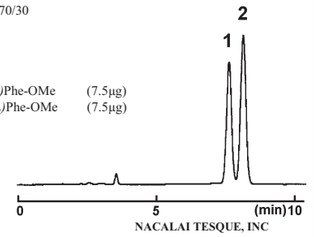
11) Amino Acids, Peptides and Proteins

● Amino-Acid Derivatives (Diastereomer)

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Boc-*(L)*Phe-*(L)*Phe-OMe (7.5µg)
2; Boc-*(D)*Phe-*(L)*Phe-OMe (7.5µg)



NACALAI TESQUE, INC

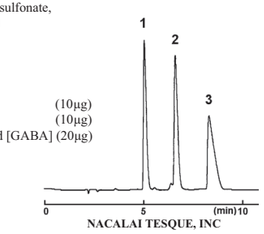
AP-0241

● The umami of Vesitables

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 5mmol/l Sodium *1*-Hexanesulfonate, 20mmol/l Phosphoric Acid
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Aspartic Acid (10µg)
2; Glutamic Acid (10µg)
3; *4*-Amino-*n*-butyric Acid [GABA] (20µg)



NACALAI TESQUE, INC

AP-1015

● Energy Drink

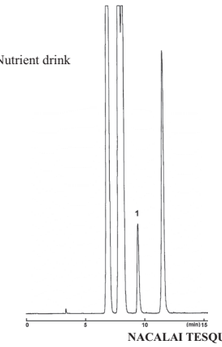
COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 10mmol/l Ammonium Acetate = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample: 1; Taurine Standard (10mg/ml)
Injection Vol. 0.5µl

Standard

Nutrient drink



NACALAI TESQUE, INC

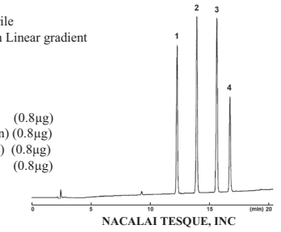
AP-1050

● Peptides

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-H_2O
B; 0.05%TFA-Acetonitrile
B conc. 10→40% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Oxytocin (0.8µg)
2; Angiotensin II(Human) (0.8µg)
3; Angiotensin I(Human) (0.8µg)
4; Substance P (0.8µg)



NACALAI TESQUE, INC

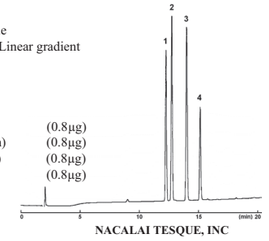
AP-0350

● Peptides

COSMOSIL Application Data

Column: Cholester
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-H_2O
B; 0.05%TFA-Acetonitrile
B conc. 10→40% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Oxytocin (0.8µg)
2; Angiotensin II(Human) (0.8µg)
3; Angiotensin I(Human) (0.8µg)
4; Substance P (0.8µg)



NACALAI TESQUE, INC

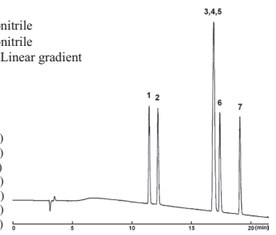
AP-0238

11) Amino Acids, Peptides and Proteins

● Peptides

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: A; 0.05%TFA-10%Acetonitrile
B; 0.05%TFA-30%Acetonitrile
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm
Sample:
1; Angiotensin II, [Sar^1,Thr^8] (0.49μg)
2; Angiotensin II, [Sar^1,Ala^8] (0.49μg)
3; Angiotensin II, Des-Asp^1-[Ile^8] (0.49μg)
4; Angiotensin II, [Sar^1,Ile^8] (0.49μg)
5; Angiotensin II, [Asn^1,Val^5] (0.49μg)
6; Angiotensin II, [Val^5] (0.49μg)
7; Angiotensin II (Human) (0.49μg)



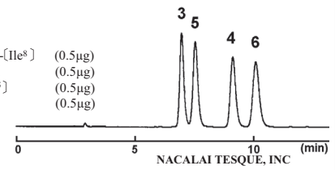
NACALAI TESQUE, INC

AP-1005

● Peptides

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 10mmol/l Phosphate buffer(pH7.0) = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm
Sample:
3; Angiotensin II, Des-Asp1-[Ile^8] (0.5μg)
4; Angiotensin II, [Sar^1,Ile^8] (0.5μg)
5; Angiotensin II, [Asn^1,Val^5] (0.5μg)
6; Angiotensin II, [Val^5] (0.5μg)



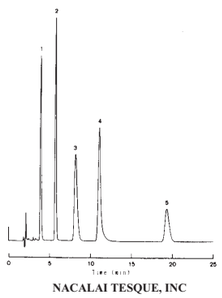
NACALAI TESQUE, INC

AP-0316

● Peptides

COSMOSIL Application Data

Column: $5C_{18}$-AR-300
Column size: 4.6mmI.D.-150mm
Mobile phase: 0.05%TFA-22%Acetonitrile
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.16AUFS
Sample: 1; Bradykinin (1.0μg)
2; Angiotensin II (1.0μg)
3; Neurotensin (1.0μg)
4; Bombesin (1.0μg)
5; Substance P (1.0μg)



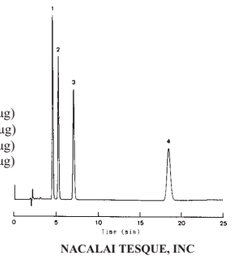
NACALAI TESQUE, INC

AP-0009

● Peptides

COSMOSIL Application Data

Column: $5C_{18}$-AR-300
Column size: 4.6mmI.D.-150mm
Mobile phase: 0.05%TFA-22%Acetonitrile
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.16AUFS
Sample: 1; Met-Enkephalin (0.5μg)
2; [Ala^2]-Met-Enkephalin (0.5μg)
3; Leu-Enkephalin (0.5μg)
4; [Ala^2]-Leu-Enkephalin (0.5μg)



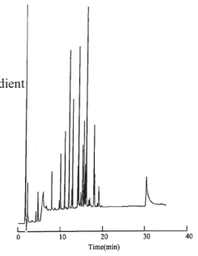
NACALAI TESQUE, INC

AP-0005

● Peptide Mappings

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 5mmol/l TFA-H_2O
B; 5mmol/l TFA-60%Acetonitrile
B conc. 0→100% 30min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm, 0.32AUFS
Sample: Cytochrome C
Lysyl Endopeptidase digested
(2.5μl)



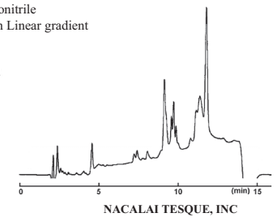
NACALAI TESQUE, INC

AP-0002

● Semi-purified Myosin

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS
Sample: Myosin (20μg)



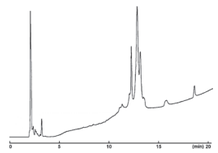
NACALAI TESQUE, INC

AP-0346

● Milk Protein

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-H_2O
B; 0.05%TFA-Acetonitrile
B conc. 20→80% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm
Sample: Milk
Sample Preparation:
・Ultracentrifuged at 90,000 g for 1 hr.
・Clear supernatant solution was injected.
Injection vol.: 1.0μl



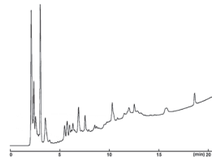
NACALAI TESQUE, INC

AP-1079

● Soymilk Protein

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-H_2O
B; 0.05%TFA-Acetonitrile
B conc. 20→80% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm
Sample: Soybean Milk
Sample Preparation:
・Ultracentrifuged at 90,000 g for 1 hr.
・Clear supernatant solution was injected.
Injection vol.: 1.0μl



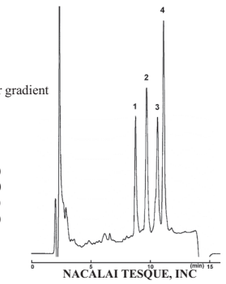
NACALAI TESQUE, INC

AP-1080

● Bacteria-derived Proteins

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS
Sample: 1; Choline Oxidase (6.0μg)
2; α-Amylase (3.0μg)
3; Glucose Oxidase (6.0μg)
4; Thermolysin (9.0μg)



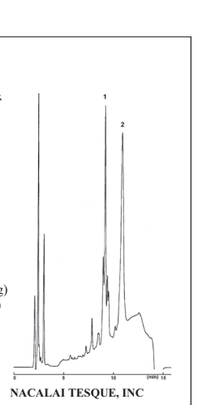
NACALAI TESQUE, INC

AP-0337

● Bacteria-derived Proteins

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS
Sample: 1; Actinase E (13.4μg)
2; Alcohol Dehydrogenase (6.6μg)



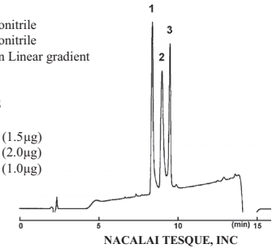
NACALAI TESQUE, INC

AP-0338

● Human-derived Proteins

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS
Sample: 1; Transferrin (1.5μg)
2; Albumin(Human) (2.0μg)
3; Carbonic Anhydrase (1.0μg)



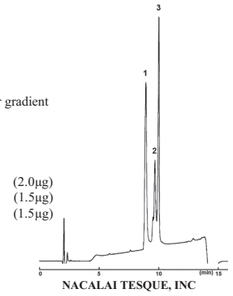
NACALAI TESQUE, INC

AP-0339

● Bovine-derived Proteins

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS
Sample: 1; Albumin(Bovine) (2.0μg)
2; L-Glutamic Dehydrogenase (1.5μg)
3; Carbonic Anhydrase (1.5μg)



NACALAI TESQUE, INC

AP-0340

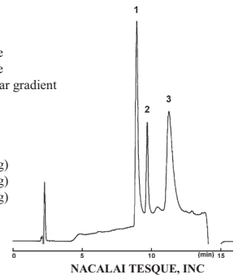
11) Amino Acids, Peptides and Proteins

● Bovine-derived Proteins

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS

Sample: 1; Fibrinogen (4.0µg)
2; Catalase (2.0µg)
3; Thyroglobulin (6.0µg)



NACALAI TESQUE, INC

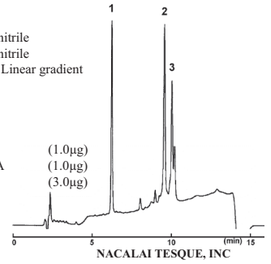
AP-0341

● Bovine Spleen-derived Proteins

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS

Sample: 1; Ribonuclease A (1.0µg)
2; α-Chymotrypsinogen A (1.0µg)
3; Deoxyribonuclease I (3.0µg)



NACALAI TESQUE, INC

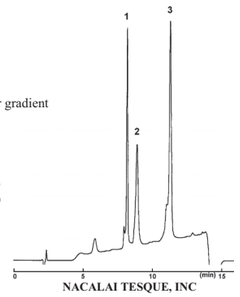
AP-0342

● Egg-derived Proteins

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS

Sample: 1; Lysozyme (1.0µg)
2; Conalbumin (2.0µg)
3; Albumin(Ovalbumin)(1.8µg)



NACALAI TESQUE, INC

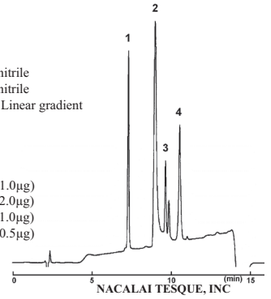
AP-0343

● Other Proteins

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS

Sample: 1; Cytochrome C (1.0µg)
2; Albumin (Goat) (2.0µg)
3; Myoglobin (1.0µg)
4; Concanavalin A (0.5µg)



NACALAI TESQUE, INC

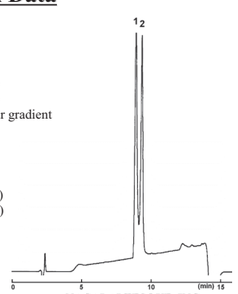
AP-0344

● Other Proteins

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS

Sample: 1; Albumin(Rabbit) (3.2µg)
2; Peroxidase (3.2µg)



NACALAI TESQUE, INC

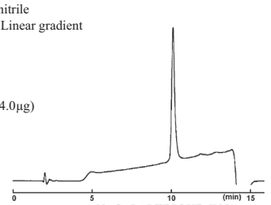
AP-0345

● Pyruvate Kinase

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS

Sample: Pyruvate Kinase (4.0µg)



NACALAI TESQUE, INC

AP-0348

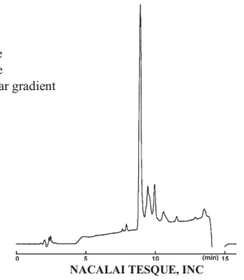
11) Amino Acids, Peptides and Proteins

● Semi-purified Diaphorase

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A:0.05%TFA-20%Acetonitrile
B:0.05%TFA-60%Acetonitrile
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.256AUFS

Sample: Diaphorase (6.0µg)



NACALAI TESQUE, INC

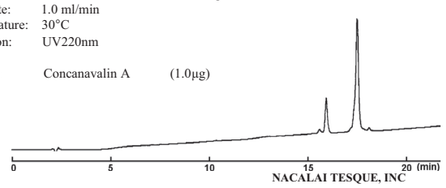
AP-0347

● Glycoproteins

COSMOSIL Application Data

Column: Protein-R
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-20%Acetonitrile
B; 0.05%TFA-60%Acetonitrile
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: Concanavalin A (1.0µg)



NACALAI TESQUE, INC

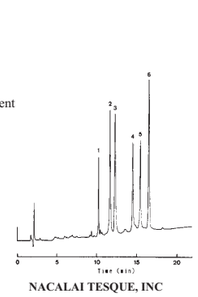
AP-0352

● Proteins

COSMOSIL Application Data

Column: $5C_{18}$-AR-300
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-20%Acetonitrile
B; 0.05%TFA-60%Acetonitrile
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.64AUFS

Sample: 1; Insulin (1.5µg)
2; Trypsinogen (6.0µg)
3; Transferrin (4.0µg)
4; Trypsin Inhibitor, Soybean (5.0µg)
5; α-Chymotrypsinogen A (4.0µg)
6; Carbonic Anhydrase (3.0µg)



NACALAI TESQUE, INC

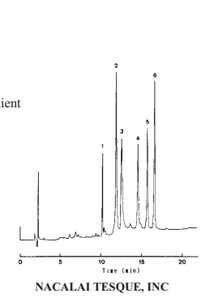
AP-0017

● Proteins

COSMOSIL Application Data

Column: $5C_8$-AR-300
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-20%Acetonitrile
B; 0.05%TFA-60%Acetonitrile
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.64AUFS

Sample: 1; Insulin (1.5µg)
2; Trypsinogen (6.0µg)
3; Transferrin (4.0µg)
4; Trypsin Inhibitor, Soybean (5.0µg)
5; α-Chymotrypsinogen A (4.0µg)
6; Carbonic Anhydrase (3.0µg)



NACALAI TESQUE, INC

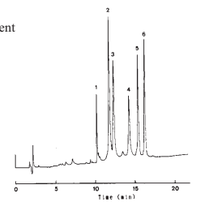
AP-0018

● Proteins

COSMOSIL Application Data

Column: $5C_4$-AR-300
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-20%Acetonitrile
B; 0.05%TFA-60%Acetonitrile
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.64AUFS

Sample: 1; Insulin (1.5µg)
2; Trypsinogen (6.0µg)
3; Transferrin (4.0µg)
4; Trypsin Inhibitor, Soybean (5.0µg)
5; α-Chymotrypsinogen A (4.0µg)
6; Carbonic Anhydrase (3.0µg)



NACALAI TESQUE, INC

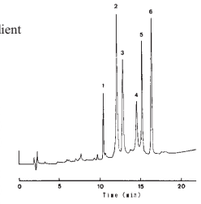
AP-0019

● Proteins

COSMOSIL Application Data

Column: 5Ph-AR-300
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-20%Acetonitrile
B; 0.05%TFA-60%Acetonitrile
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.64AUFS

Sample: 1; Insulin (1.5µg)
2; Trypsinogen (6.0µg)
3; Transferrin (4.0µg)
4; Trypsin Inhibitor, Soybean (5.0µg)
5; α-Chymotrypsinogen A (4.0µg)
6; Carbonic Anhydrase (3.0µg)



NACALAI TESQUE, INC

AP-0020

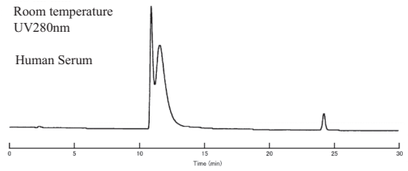
11) Amino Acids, Peptides and Proteins

● Human Serum

COSMOSIL Application Data

Column: 5Diol-120-II
Column size: 7.5mmI.D.-600mm
Mobile phase: 20mmol/l Phosphate buffer(pH 7.0)
+100mmol/l Na_2SO_4
Flow rate: 1.0 ml/min
Temperature: Room temperature
Detection: UV280nm

Sample: Human Serum



NACALAI TESQUE, INC

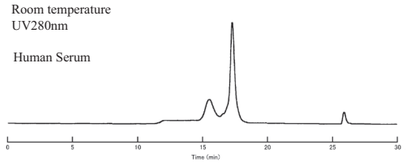
AP-0382

● Human Serum

COSMOSIL Application Data

Column: 5Diol-300-II
Column size: 7.5mmI.D.-600mm
Mobile phase: 20mmol/l Phosphate buffer(pH 7.0)
+100mmol/l Na_2SO_4
Flow rate: 1.0 ml/min
Temperature: Room temperature
Detection: UV280nm

Sample: Human Serum



NACALAI TESQUE, INC

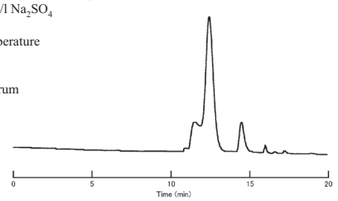
AP-0383

● Bovine Serum

COSMOSIL Application Data

Column: 5Diol-120-II
Column size: 7.5mmI.D.-600mm
Mobile phase: 20mmol/l Phosphate buffer(pH 7.0)
+100mmol/l Na_2SO_4
Flow rate: 1.0 ml/min
Temperature: Room temperature
Detection: UV280nm

Sample: Bovine Serum



NACALAI TESQUE, INC

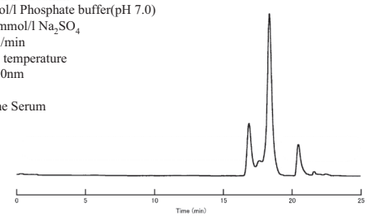
AP-0386

● Bovine Serum

COSMOSIL Application Data

Column: 5Diol-300-II
Column size: 7.5mmI.D.-600mm
Mobile phase: 20mmol/l Phosphate buffer(pH 7.0)
+100mmol/l Na_2SO_4
Flow rate: 1.0 ml/min
Temperature: Room temperature
Detection: UV280nm

Sample: Bovine Serum



NACALAI TESQUE, INC

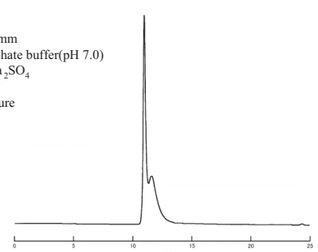
AP-0387

● Egg White

COSMOSIL Application Data

Column: 5Diol-120-II
Column size: 7.5mmI.D.-600mm
Mobile phase: 20mmol/l Phosphate buffer(pH 7.0)
+100mmol/l Na_2SO_4
Flow rate: 1.0 ml/min
Temperature: Room temperature
Detection: UV280nm

Sample: Egg White



NACALAI TESQUE, INC

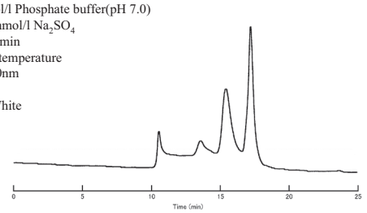
AP-0384

● Egg White

COSMOSIL Application Data

Column: 5Diol-300-II
Column size: 7.5mmI.D.-600mm
Mobile phase: 20mmol/l Phosphate buffer(pH 7.0)
+100mmol/l Na_2SO_4
Flow rate: 1.0 ml/min
Temperature: Room temperature
Detection: UV280nm

Sample: Egg White



NACALAI TESQUE, INC

AP-0385

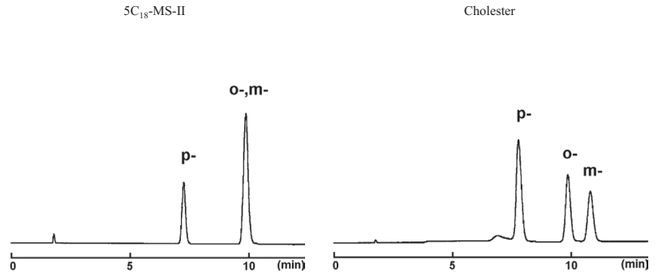
12) The others

● Methoxyphenols

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: *o*-Methoxyphenol (3.3μg)
m-Methoxyphenol (3.3μg)
p-Methoxyphenol (3.3μg)



NACALAI TESQUE, INC

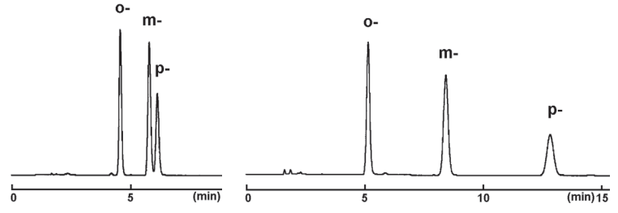
AP-1041

● Terphenyls

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: *o*-Terphenyl (0.15μg)
m-Terphenyl (0.05μg)
p-Terphenyl (0.075μg)



NACALAI TESQUE, INC

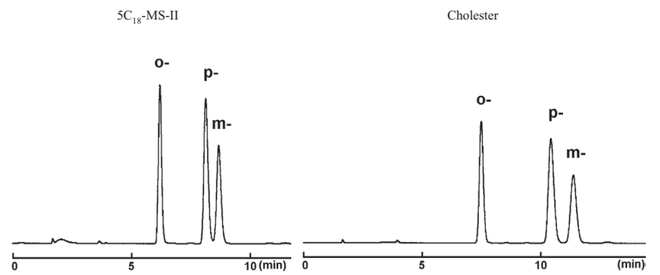
AP-1042

● Chlorophenols

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: *o*-Chlorophenol (2.0μg)
m-Chlorophenol (2.0μg)
p-Chlorophenol (4.0μg)



NACALAI TESQUE, INC

AP-1043

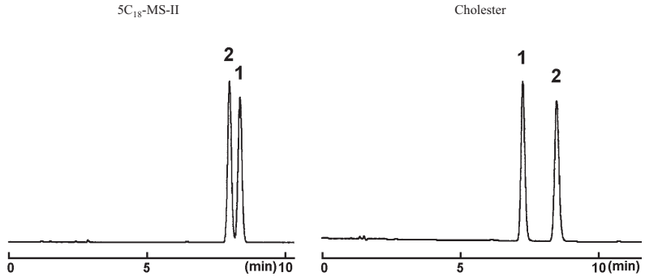
12) The others

● Stilbenes

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; *cis*-Stilbene (0.10μg)
2; *trans*-Stilbene (0.20μg)



NACALAI TESQUE, INC

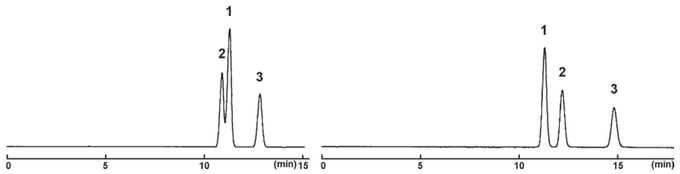
AP-1045

● Halogenated Benzenes

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Toluene (3.3μg)
2; Chlorobenzene (3.3μg)
3; Bromobenzene (3.3μg)



NACALAI TESQUE, INC

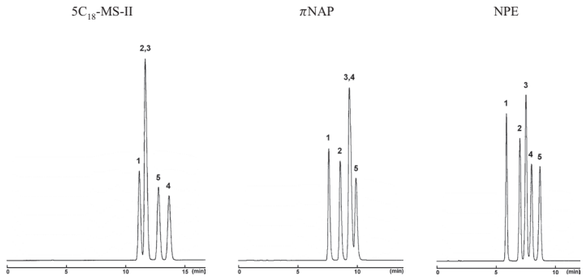
AP-1046

● Fluorinated Benzenes

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: $5C_{18}$-MS-II Methanol/ H_2O = 50/50
πNAP Methanol/ H_2O = 50/50
NPE Methanol/ H_2O = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Benzene (6.0μg)
2; Fluorobenzene (2.0μg)
3; *1,4*-Difluorobenzene (2.0μg)
4; *1,3*-Difluorobenzene (2.0μg)
5; *1,2*-Difluorobenzene (2.0μg)



NACALAI TESQUE, INC

AP-1054

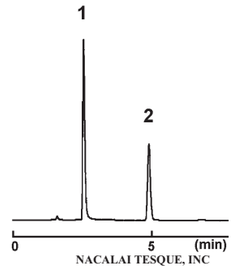
12) The others

● Pyridine and Phenol

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Pyridine (0.1μg)
2; Phenol (0.1μg)



NACALAI TESQUE, INC

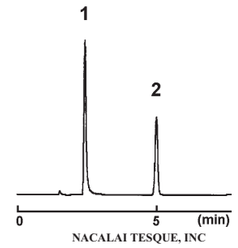
AP-0239

● Pyridine and Phenol

COSMOSIL Application Data

Column: Cholester
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Pyridine (0.1μg)
2; Phenol (0.1μg)



NACALAI TESQUE, INC

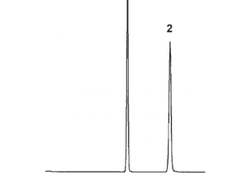
AP-0240

● Uracil and Uridine

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Uracil (0.1μg)
2; Uridine (0.2μg)



NACALAI TESQUE, INC

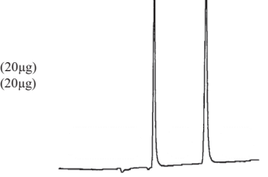
AP-0299

● Glycerol

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 95/5
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; Trimethylene Glycol (20μg)
2; Glycerol (20μg)



NACALAI TESQUE, INC

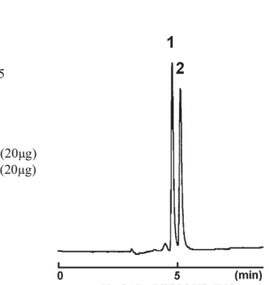
AP-0301

● Ethylene Glycol

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 95/5
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; Trimethylene Glycol (20μg)
2; Ethylene Glycol (20μg)



NACALAI TESQUE, INC

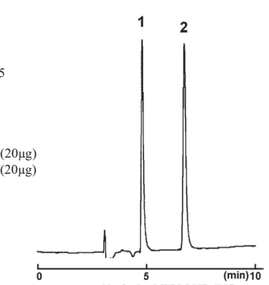
AP-0303

● Diethylene Glycol

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 95/5
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: 1; Diethylene Glycol (20μg)
2; Glycerol (20μg)



NACALAI TESQUE, INC

AP-0310

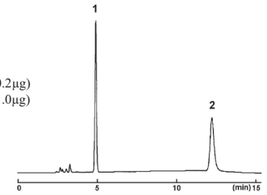
12) The others

● Oxalic Acid

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 10mmol/l Phosphate buffer(pH7.0) = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Oxamic Acid (0.2μg)
2; Oxalic Acid (1.0μg)



NACALAI TESQUE, INC

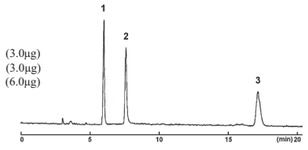
AP-0307

● Hydrophilic Compounds (Ionicity)

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 50mmol/l Ammonium Acetate = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample:
1; *meso*-Erythritol (3.0μg)
2; Tris(hydroxymethyl)aminomethane (3.0μg)
3; Glyceric Acid (6.0μg)



NACALAI TESQUE, INC

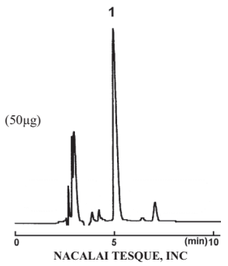
AP-0305

● Fluorine Compounds

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-250mm
Mobile phase: 0.1%TFA-95%Methanol
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: Perfluorotetradecanoic Acid (50μg)



NACALAI TESQUE, INC

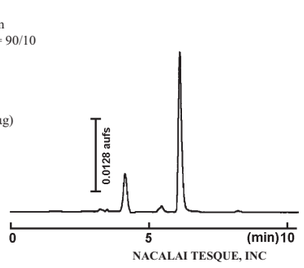
AP-0381

● Urea

COSMOSIL Application Data

Column: HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/H_2O = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: Urea (20μg)



NACALAI TESQUE, INC

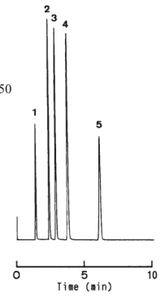
AP-1004

● Acid Compounds

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile / 0.1% Phosphoric Acid = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.32AUFS

Sample: 1; Uracil (0.05μg)
2; Benzoic Acid (1.0μg)
3; *o*-Toluic Acid (1.0μg)
4; *p*-Ethylbenzoic Acid (0.2μg)
5; Benzene



NACALAI TESQUE, INC

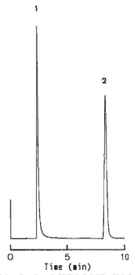
AP-0164

● Basic Compounds

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH3) = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.2AUFS

Sample: 1; 2-Ethylpyridine (0.4μg)
2; *N,N*-Dimethylaniline (0.6μg)



NACALAI TESQUE, INC

AP-0166

12) The others

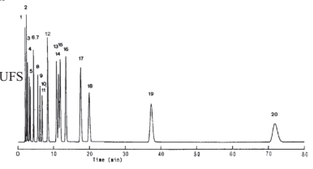
● Monosubstituted Benzenes (20 samples)

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.16AUFS

Sample:

1; Benzamide	(0.49μg)		
2; Aniline	(0.4μg)		
3; Phenol	(0.67μg)		
4; Benzonitrile	(0.83μg)		
5; Acetophenone	(0.04μg)		
6; Styrene oxide	(1.1μg)		
7; Nitrobenzene	(0.06μg)	14; Chlorobenzene	(7.05μg)
8; Methylbenzoate	(0.62μg)	15; Toluene	(5.84μg)
9; Anisole	(0.79μg)	16; Bromobenzene	(15.37μg)
10; Fluorobenzene	(0.65μg)	17; Iodobenzene	(3.66μg)
11; Benzene	(0.79μg)	18; Ethylbenzene	(6.87μg)
12; N,N-Dimethylaniline	(0.15μg)	19; n-Propylbenzene	(14.1μg)
13; Thioanisole	(0.12μg)	20; n-Butylbenzene	(15.93μg)



NACALAI TESQUE, INC

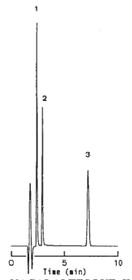
AP-0154

● Furans

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 30/70
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm, 0.2AUFS

Sample: 1; Furfuryl alcohol (0.13μg)
2; Furfural (0.25μg)
3; Furan (0.23μg)



NACALAI TESQUE, INC

AP-0155

● Phenolphthalein

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / H_2O = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.1AUFS

Sample: Phenolphthalein (0.6μg)

NACALAI TESQUE, INC

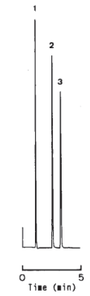
AP-0156

● Anilines

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile / 0.1% Phosphoric Acid = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Aniline
2; *p*-Nitroaniline
3; *2,4*-Dinitroaniline



NACALAI TESQUE, INC

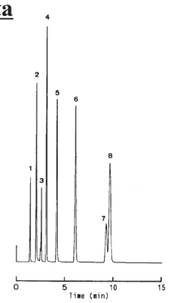
AP-0160

● Esters and others

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.32AUFS

Sample: 1; Uracil
2; Pyridine
3; Phenol
4; Ethyl *p*-Hydroxybenzoate
5; Propyl *p*-Hydroxybenzoate
6; Methyl Salicylate
7; Toluene
8; Ethyl Salicylate



NACALAI TESQUE, INC

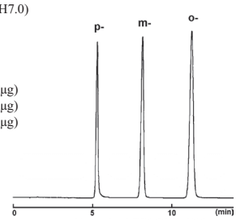
AP-0163

● Aminophenols

COSMOSIL Application Data

Column: $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphate buffer(pH7.0)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: *p*-Aminophenol (0.33μg)
m-Aminophenol (1.00μg)
o-Aminophenol (1.67μg)



NACALAI TESQUE, INC

AP-1059

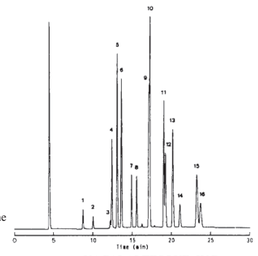
12) The others

● Polyaromatic Compounds

COSMOSIL Application Data

Column: $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; Methanol / H_2O = 70/30
B; Methanol
B conc.0→100%
3→15min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.64AUFS

Sample:
1; Naphthalene
2; Acenaphthylene
3; Acenaphthene
4; Fluorene
5; Phenanthrene
6; Anthracene
7; Fluoranthene
8; Pyrene
9; Benz*[a]*anthracene
10; Chrysene
11; Benzo*[b]*fluoranthene
12; Benz*[a]*pyrene
13; Benzo*[a]*pyrene
14; Dibenz*[a,h]*anthracene
15; Benzo*[g,h,i]*perylene
16; Indeno*[1,2,3-c,d]*pyrene



NACALAI TESQUE, INC

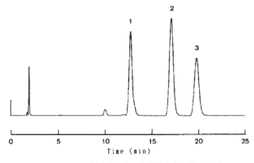
AP-0161

● Benzylpyridines

COSMOSIL Application Data

Column: 5PYE
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l KH_2PO_4 = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; 2-Benzylpyridine
2; 3-Benzylpyridine
3; 4-Benzylpyridine



NACALAI TESQUE, INC

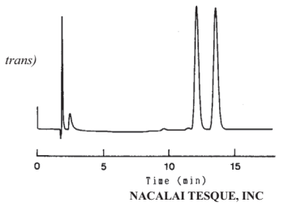
AP-0182

● Carvylacetate

COSMOSIL Application Data

Column: 5PYE
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV215nm

Sample: Carvylacetate *(cis, trans)*



NACALAI TESQUE, INC

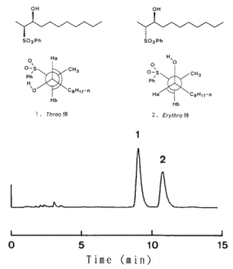
AP-0184

● Diastereomers

COSMOSIL Application Data

Column: 5PYE
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / H_2O = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; *Threo* form
2; *Erythro* form



NACALAI TESQUE, INC

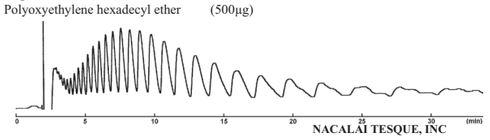
AP-0186

● Surfactant

COSMOSIL Application Data

Column: 5PBB-R
Column size: 4.6mmI.D.-150mm
Mobile phase: Tetrahydrofuran /Methanol = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample:
Polyoxyethylene hexadecyl ether (500µg)



NACALAI TESQUE, INC

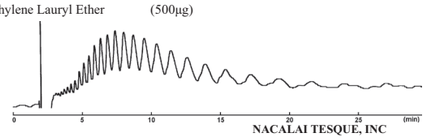
AP-0354

● Surfactant

COSMOSIL Application Data

Column: 5PBB-R
Column size: 4.6mmI.D.-150mm
Mobile phase: Tetrahydrofuran /Methanol = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample:
Polyoxyethylene Lauryl Ether (500µg)



NACALAI TESQUE, INC

AP-0364

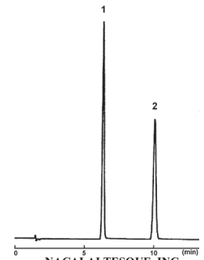
12) The others

● Aromatic Compounds

COSMOSIL Application Data

Column: 5PBB-R
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Diphenylmethane (5.80µg)
2; Fluorene (0.13µg)



NACALAI TESQUE, INC

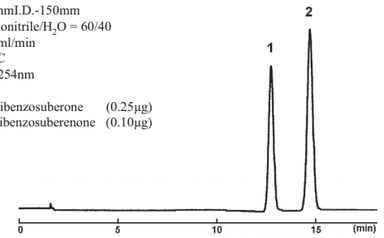
AP-0358

● Aromatic Compounds

COSMOSIL Application Data

Column: 5PBB-R
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Dibenzosuberone (0.25µg)
2; Dibenzosuberenone (0.10µg)



NACALAI TESQUE, INC

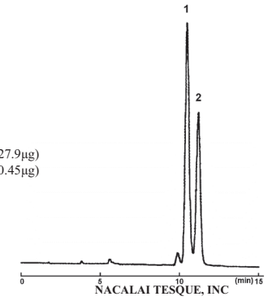
AP-0360

● Aromatic Compounds

COSMOSIL Application Data

Column: 5PBB-R
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Propylbenzene (27.9µg)
2; Allylbenzene (0.45µg)



NACALAI TESQUE, INC

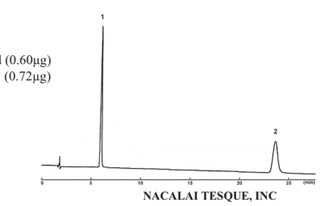
AP-0362

● Aromatic Compounds

COSMOSIL Application Data

Column: 5PBB-R
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/H_2O = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; *1,1'*-Binapthyl (0.60µg)
2; Perylene (0.72µg)



NACALAI TESQUE, INC

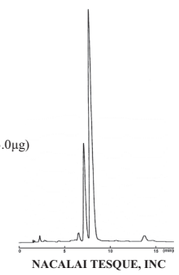
AP-0356

● Coloring agent (CBB)

COSMOSIL Application Data

Column: $5C_{18}$-MS-II
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH2.5) = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: Coomassie Brilliant Blue G-250 (3.0µg)



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AP-1061

4. Reference list

No.	Column	TITLE	AUTHOR	JOURNAL	YEAR	VOL. (ISSUE)	PAGE
1	Cholester	Improved separation of furocoumarins of essential oils by supercritical fluid chromatography	C. Desmortreux, M. Rothaupt, C. West and E. Lesellier	Journal of Chromatography A	2009	1216(42)	7088-7095
2	Cholester	Preparative Separation of cis- and trans-Isomers of Unsaturated Fatty Acid Methyl Esters Contained in Edible Oils by Reversed-Phase High-Performance Liquid Chromatography.	Tsuzuki W, Ushida K.	Lipids.	2009	44(4)	373-379
3	Cholester $5C_{18}$-AR-II	Isolation and Structure of a Galactocerebroside from the Sea Cucumber Bohadschia argus	Yuriko Ikeda, Masanori Inagaki, Koji Yamada, Xiao Wen Zhang, Bo Zhang, Tomofumi Miyamoto and Ryuichi Higuchi	CHEMICAL & PHARMACEUTICAL BULLETIN	2009	57(3)	315-317
4	Cholester	Influence of Cold Hardening on Chlorophyll and Carotenoid in Chlorella vulgaris	Watanabe Yuta, Yamada Naotaka, Machida Takeshi, Honjoh Ken-ichi, Kuwano Eiichi	Journal of the Faculty of Agriculture, Kyushu University	2009	54(1)	195-200
5	Cholester	Pyripyropenes, Fungal Sesquiterpenes Conjugated with α-Pyrone and Pyridine Moieties, Exhibits Anti-angiogenic Activity against Human Umbilical Vein Endothelial Cells	Asami Hayashi, Masayoshi Arai, Mayumi Fujita and Motomasa Kobayashi	Biological & Pharmaceutical Bulletin	2009	32(7)	1261-1265
6	Cholester	Practical Electrochemical Iodination of Aromatic Compounds	Kazuhide Kataoka, Yuji Hagiwara, Koji Midorikawa, Seiji Suga and Jun-ichi Yoshida	Org. Process Res. Dev.	2008	12(6)	1130–1136
7	Cholester	De novo synthesis of (Z)- and (E)-7-hexadecenylitaconic acids by a selective lignin-degrading fungus, Ceriporiopsis subvermispora	Hiroshi Nishimura, Saeko Tsuda, Hitoe Shimizu, Yasunori Ohashi, Takahito Watanabe, Yoichi Honda and Takashi Watanabe	Phytochemistry	2008	69(14)	2593-2602
8	Cholester	Kadsuracoccinic Acids A−C, Ring-A seco-Lanostane Triterpenes from Kadsura coccinea and Their Effects on Embryonic Cell Division of Xenopus laevis	Heran Li, Liyan Wang, Syohei Miyata and Susumu Kitanaka	J. Nat. Prod.	2008	71(4)	739–741
9	Cholester	Peptide Thioester Synthesis via an Auxiliary-Mediated N−S Acyl Shift Reaction in Solution	Ken'ichiroh Nakamura, Hiroaki Mori, Toru Kawakami, Hironobu Hojo, Yoshiaki Nakahara and Saburo Aimoto	International Journal of Peptide Research and Therapeutics	2007	13(1-2)	191-202
10	Cholester	Metachromins L–Q, new sesquiterpenoid quinones with an amino acid residue from sponge Spongia sp.	Yohei Takahashi, Takaaki Kubota, Jane Fromont and Jun'ichi Kobayashi	Tetrahedron	2007	63(36)	8770-8773
11	Cholester	Metachromins R−T, New Sesquiterpenoids from Marine Sponge Spongia sp.	Yohei Takahashi, Mika Yamada, Takaaki Kubota, Jane Fromont and Jun'ichi Kobayashi	CHEMICAL & PHARMACEUTICAL BULLETIN	2007	55(No.12)	1731-1733
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13	PYE	Possibility of predicting separations in supercritical fluid chromatography with the solvation parameter model	C. West, J. Ogden and E. Lesellier	Journal of Chromatography A	2009	1216 (29)	5600-5607
14	PYE	Calculations and assignments of endohedral helium-3 chemical shifts of open-cage fullerenes and higher fullerenes	Guan-Wu Wang and Ping Wu	Theoretical Chemistry Accounts	2009	123 (5-6)	375-381
15	PYE	Effects of π-π Interactions on the Separation of PAHs on Phenyl-Type Stationary Phases	Paul G. Stevenson; Sindy Kayillo; Gary R. Dennis; R. Andrew Shalliker	Journal of Liquid Chromatography & Related Technologies	2008	31(3)	324-347
16	PYE	Organochlorine contaminants in endangered Steller sea lion pups (Eumetopias jubatus) from western Alaska and the Russian Far East	Matthew J. Myers, Gina M. Ylitalo, Margaret M. Krahn, Daryle Boyd, Don Calkins, Vladimir Burkanov and Shannon Atkinson	Science of The Total Environment	2008	396 (1)	60-69
17	PYE	Spatial extent, magnitude, and patterns of persistent organochlorine pollutants in Pacific herring (Clupea pallasi) populations in the Puget Sound (USA) and Strait of Georgia (Canada)	James E. West, Sandra M. O'Neill, and Gina M. Ylitalo	Science of The Total Environment	2008	394 (2-3)	369-378
18	PYE	Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) in marine mussels from French coasts: Levels, patterns and temporal trends from 1981 to 2005	C. Munschy, N. Guiot, K. Héas-Moisan, C. Tixier and J. Tronczyński	Chemosphere	2008	73 (6)	945-953
19	PYE	Analysis of chlorothalonil and degradation products in soil and water by GC/MS and LC/MS	Alicia Chaves, Damian Shea, David Danehower	Chemosphere	2008	71(4)	629-638
20	PYE	Polychlorinated Naphthalenes and Other Dioxin-Like Compounds in Elbe River Sediments	W Brack, L Bláha, J.P Giesy, M Grote, M Moeder, S Schrader and M Hecker	Environmental Toxicology and Chemistry	2008	27 (3)	519-528
21	PYE	Extraction and high-performance liquid chromatographic analysis of C_{60}, C_{70}, and [6,6]-phenyl C_{61}-butyric acid methyl ester in synthetic and natural waters	Dermont Bouchard, and Xin Ma	Journal of Chromatography A	2008	1203 (2)	153-159
22	PYE	Orthogonal screening system of columns for supercritical fluid chromatography	C. West, and E. Lesellier	Journal of Chromatography A	2008	1203 (1)	105-113
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24	PYE	Automated fractionation procedure for polycyclic aromatic compounds in sediment extracts on three coupled normal-phase high-performance liquid chromatography columns	Urte Lübcke-von Varel, Georg Streck, Werner Brack	Journal of Chromatography A	2008	1185 (1)	31-42
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27	PYE	Rapid Method for Determination of Dioxin-Like Polychlorinated Biphenyls and Other Congeners in Marine Sediments Using Sonic Extraction and Photodiode Array Detection	J. Buzitis, G. M. Ylitalo and M. M. Krahn	Archives of Environmental Contamination and Toxicology	2006	51 (3)	337-346
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30	HILIC	Development and validation of a reversed-phase high-performance liquid chromatographic method for quantification of peptide dendrimers in human skin permeation experiments	S. Mutalik, A.K. Hewavitharana, P.N. Shaw, Y.G. Anissimov, M.S. Roberts and H.S. Parekh	Journal of Chromatography B	2009	877(29)	3556-3562
31	HILIC	Direct Evidence for Efficient Transport and Minimal Metabolism of L-Cephalexin by Oligopeptide Transporter 1 in Budded Baculovirus Fraction	Keisuke Mitsuoka, Ikumi Tamai, Yasushi Morohashi, Yoshiyuki Kubo, Ryoichi Saitoh, Akira Tsuji and Yukio Kato	Biological & Pharmaceutical Bulletin	2009	32(8)	1459-1461
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34	HILIC	Convergent synthesis of oligomers of triazole-linked DNA analogue (TLDNA) in solution phase	Tomoko Fujino, Naomi Yamazaki and Hiroyuki Isobe	Tetrahedron Letters	2009	50(28)	4101-4103
35	HILIC	Determination of para-aminohippuric acid (PAH) in human plasma and urine by liquid chromatography–tandem mass spectrometry	Phey Yen Han, P. Nicholas Shaw and Carl M.J. Kirkpatrick	Journal of Chromatography B	2009	877(27)	3215-3220
36	HILIC $5C_{18}$-MS-II	Medicinal Flowers. XXI. Structures of Perennisaponins A, B, C, D, E, and F, Acylated Oleanane-Type Triterpene Oligoglycosides, from the Flowers of Bellis perennis	Masayuki Yoshikawa, Xuezheng Li, Eriko Nishida, Seikou Nakamura, Hisashi Matsuda, Osamu Muraoka and Toshio Morikawa	CHEMICAL & PHARMACEUTICAL BULLETIN	2008	56(No.4)	559-568
37	HILIC	Separation efficiencies in hydrophilic interaction chromatography	Tohru Ikegami, Kouki Tomomatsu, Hirotaka Takubo, Kanta Horie and Nobuo Tanaka	Journal of Chromatography A	2008	1184(1-2)	474-503
38	HILIC	Triazole-Linked Analogue of Deoxyribonucleic Acid (TLDNA): Design, Synthesis, and Double-Strand Formation with Natural DNA	Hiroyuki Isobe, Tomoko Fujino, Naomi Yamazaki, Marine Guillot-Nieckowski and Eiichi Nakamura	ORGANIC LETTERS	2008	10(17)	3729-3732
39	HILIC	Tetrodotoxin poisoning evidenced by solid-phase extraction combining with liquid chromatography–tandem mass spectrometry	Hsiao-Chin Jen, Shin-Jung Lin, Yung-Hsiang Tsai, Chun-Hsiang Chen, Zu-Chun Lin and Deng-Fwu Hwang	Journal of Chromatography B	2008	871(1)	95-100
40	CNT-300 CNT-1000 CNT-2000	Chromatographic Length-Separation and Photoluminescence Study on DNA-Wrapped Single-Wall and Double-Wall Carbon Nanotubes	Yuki Asada, Toshiki Sugai, Ryo Kitaura and Hisanori Shinohara	Journal of nanomaterials		in press	

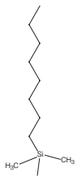
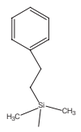
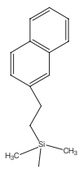
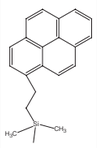
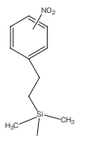
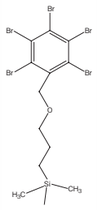
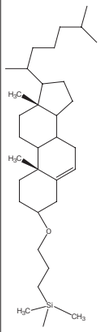
IV TECHNICAL NOTE

1. Selectivity of packing materials in reversed phase liquid chromatography

Reversed phase chromatography is the most commonly used method of HPLC, because of the high theoretical platenumber, excellent separation characteristics, reproducibility, and ease of use. Columns packed with octadecyl group bonded type silica gel (C_{18}, ODS) are the most widely used reversed phase chromatography. However, C_{18} columns provide insufficient separation for compounds similar in hydrophobicity because the main separation mechanism of C_{18} column is based on hydrophobic interaction. It may improve separation of compounds with similar hydrophobicity by using longer columns, changing mobile phases or changing temperature. However, in many cases, it is probably most effective to use different packing materials which retain compounds base on a secondary interaction in addition to hydrophobic interaction.

At Nacalai Tesque, we offer a variety of COSMOSIL reversed phase packing materials. Summary of these packing materials and their respective retention mechanism are in Table 1. Retention of compounds in each stationary phase depends on summation of the interactions. Therefore, comprehension of each interaction leads to selection of an appropriate column.

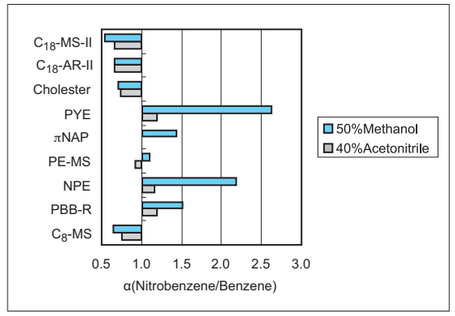
Table1. Stationary phase and interaction of packing materials

	C_{18}-MS-II	C_{18}-AR-II	C_8-MS	PE-MS	πNAP	PYE	NPE	PBB-R	Cholester
Silica gel	High purity porous spherical silica								
Average particle size	3・5・15 μm		5 μm						
Average pore size	approx. 120 Å								
Specific surface area	approx. 300 m²/g								
Stationary phase									
	Octadecyl	Octadecyl	Octyl	Phenylethyl	Naphthylethyl	Pyrenylethyl	Nitrophenylethyl	Pentabromobenzyl	Cholesteryl
Types	Monomeric	Polymeric	Monomeric	Monomeric	Monomeric	Monomeric	Monomeric	Monomeric	Monomeric
Interaciton	Hydrophobic interaction	Hydrophobic interaction	Hydrophobic interaction	Hydrophobic interaction π-π interaction	Hydrophobic interaction π-π interaction	Hydrophobic interaction π-π interaction Dispersion interaction Shape selectivity	Hydrophobic interaction π-π interaction Dipole-dipole interaction	Hydrophobic interaction Dispersion interaction	Hydrophobic interaction Shape selectivity
End capping	Near-perfect treatment								
Carbon content	approx. 16%	approx. 17%	approx. 10%	approx. 10%	approx. 11%	approx. 18%	approx. 9%	approx. 8%	approx. 20%

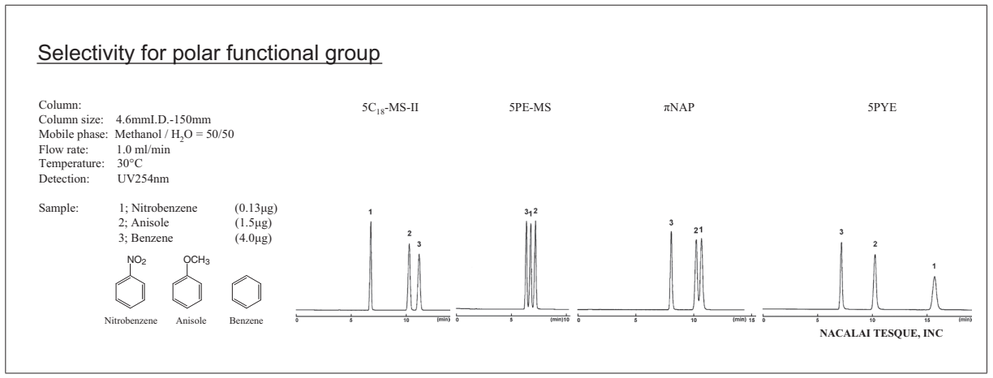
1) Selectivity for polar functional group

Selectivity

Selectivity for polar functional group is evaluated based on the separation of benzene, nitrobenzene, which has a nitro group, and anisole, which has a methoxy group. The chromatograms below show separation of the three compounds on four COSMOSIL columns : C_{18}-MS-II, PE-MS, πNAP and PYE. Elution order on the C_{18} column is as following : nitrobenzene, anisole and benzene. Elution orders on the aromatic columns are reversed. Separation on the C_{18} column is based on hydrophobic interaction only. On the other hand, the packing materials on the other three columns have aromatic rings and reverse the elution order by π-π interaction.



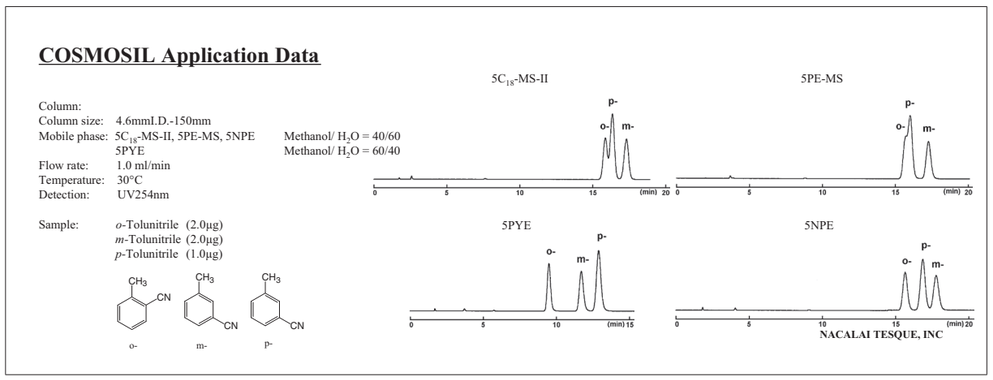
The graph of selectivity for polar functional group is shown below. Among nine COSMOSIL columns, PYE and NPE columns have the highest selectivity factors for polar groups. As to mobile phases, methanol is more effective than acetonitrile for separation using π-π interaction.



Application data

- Separation of tolunitrile position isomers

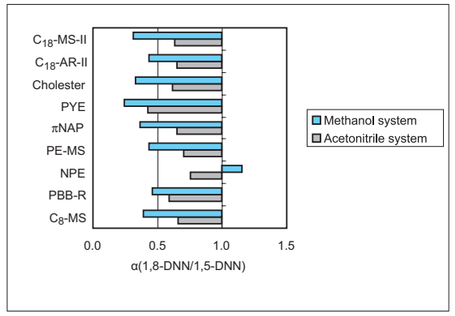
Tolunitriles have three position isomers. It is difficult to separate ortho and para isomers by C_{18} or PE-MS column because of lack of poor π-π interaction. On the other hand, the isomers are well separated on PYE or NPE column which has strong π-π interaction.

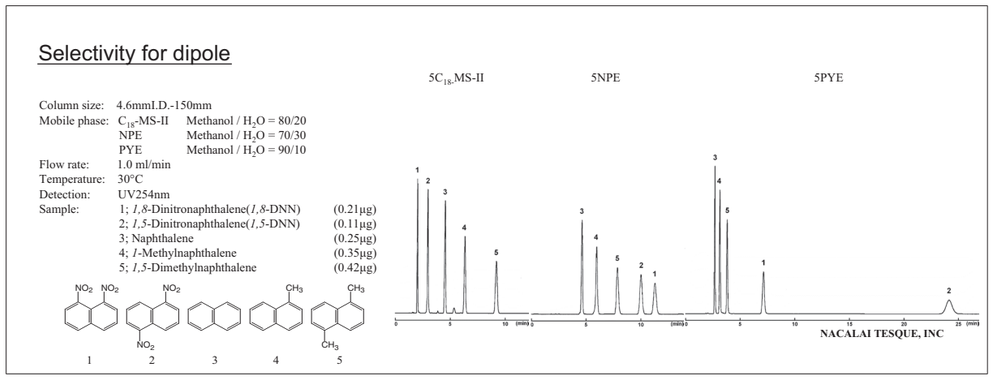


2) Selectivity for dipole

Selectivity

Selectivity for dipole is evaluated based on the separation of 1,5-dinitronaphthalene and 1,8-dinitronaphthalene.
Dinitronaphthalenes (peak 1 and 2) were strongly retained on PYE and NPE because of π-π interaction compared with dimethylnaphthalenes. However, there is a slight difference between these two columns. While 1,5-dinitronaphthalene (peak 2) was preferentially retained on PYE, 1,8-dinitronaphthalene (peak 1) was retained longer on NPE. The results with NPE indicate the presence of strong dipole-dipole interaction. The two nitro group dipoles in 1,8-dinitronaphthalene are aligned for a much greater dipolar coupling with the bonded nitrophenyl group in NPE than 1,5-dinitronaphthalene.

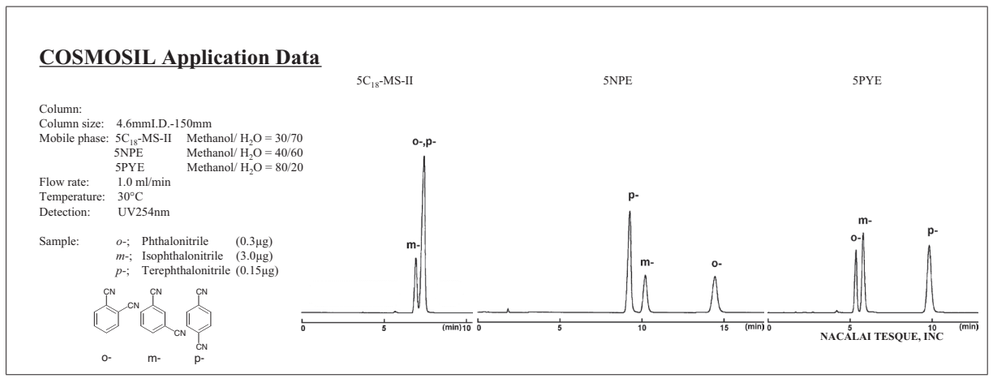




Application data

- Separation of phthalonitrile position isomers

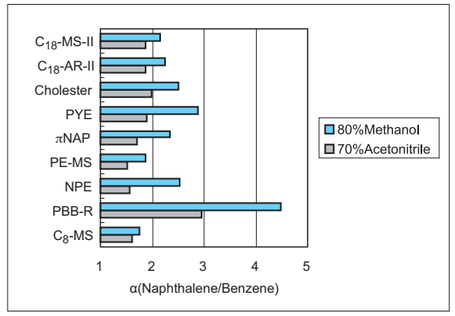
Phthalonitriles have three position isomers. NPE or PYE completely separates these compounds due to π-π interaction. Furthermore, NPE strongly retains o-phthalonitrile due to dipole-dipole interaction.

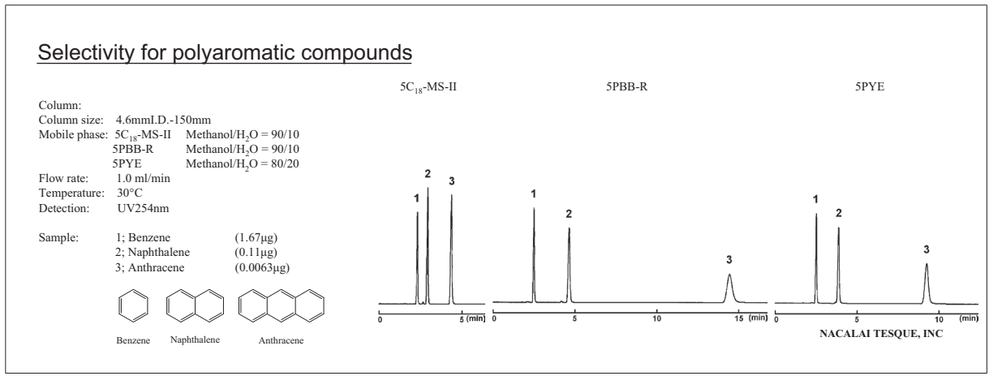


3) Selectivity for polyaromatic compounds

Selectivity

Selectivity for polyaromatic compounds is evaluated based on the separation of benzene, naphthalene and anthracene.
The elution orders in all columns are the same : benzene, naphthalene and anthracene. Retention increases in all columns with increasing number of aromatic rings. In addition, highly dispersive packing materials such as PBB and PYE show much stronger retention for polyaromatic compounds due to dispersion interaction.

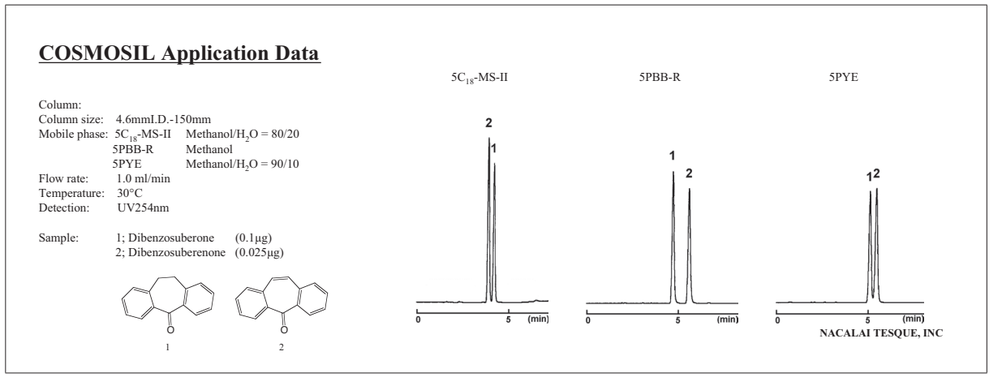




Application data

- Separation of dibenzosuberone and dibenzosuberenone

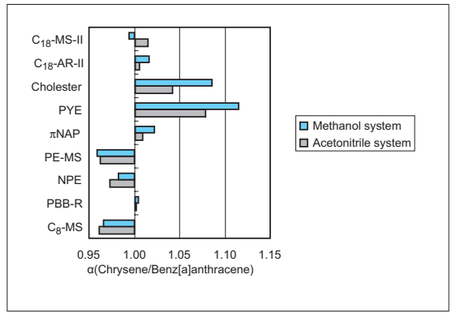
C_{18} retains dibenzosuberone (peak 1) longer than dibenzosuberenone (peak 2). On the other hand, PBB-R and PYE retain dibenzosuberenone (peak 2), which has a π-electron conjugated system, longer than dibenzosuberone (peak 1).

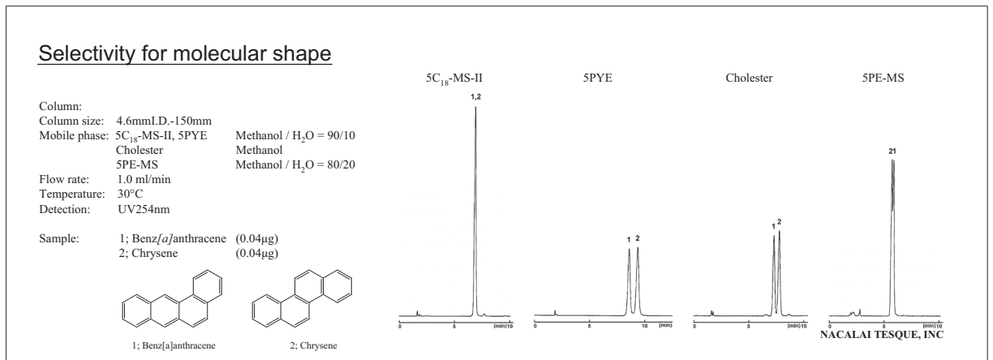


4) Selectivity for molecular shape

Selectivity

Selectivity for molecular shape is evaluated based on the separation of chrysene and benz [a] anthracene. The isomers of two polyaromatic hydrocarbons, which consist of four benzene rings, are difficult to separate because of the similar hydrophobicity or aromaticity. However, PYE and Cholester columns, which recognize molecular shape, enable them to separate chrysene and benz [a] anthracene.

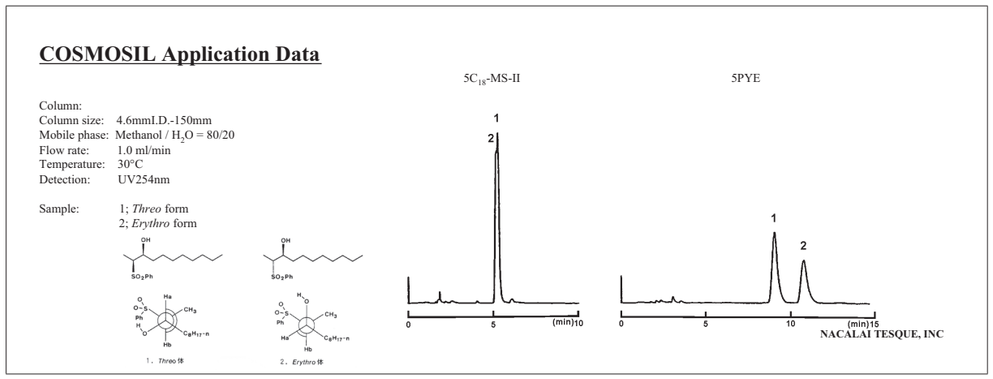




Application data

● Separation of diastereomers (threo- and erythro-)

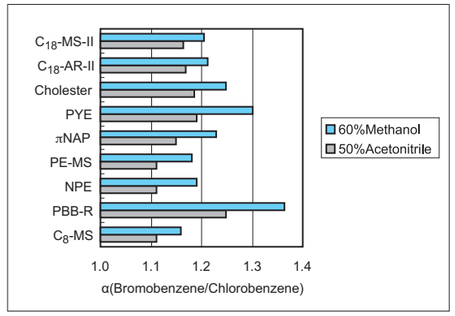
C_{18} cannot separate the threo and erythro forms. On the other hand, PYE retains the planar erythro form longer than the threo form.

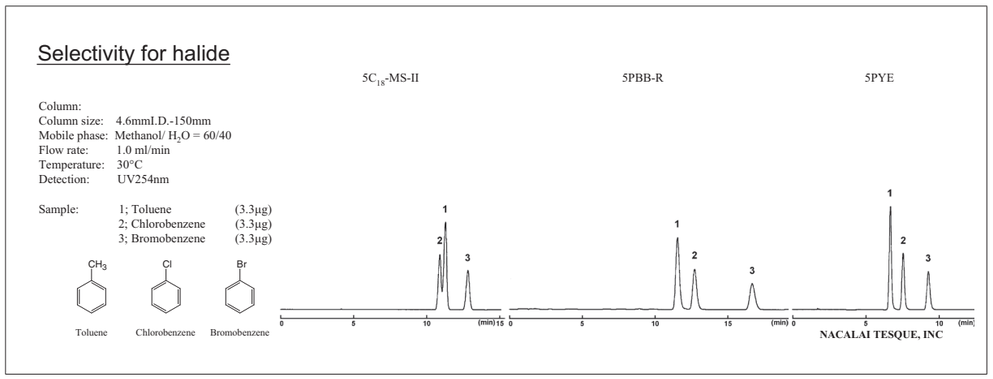


5) Selectivity for halides

Selectivity

Selectivity for halide is evaluated based on the separation of chlorobenzene and bromobenzene. PBB-R shows the highest selectivity factor due to dispersion interaction of the five bromine atoms.

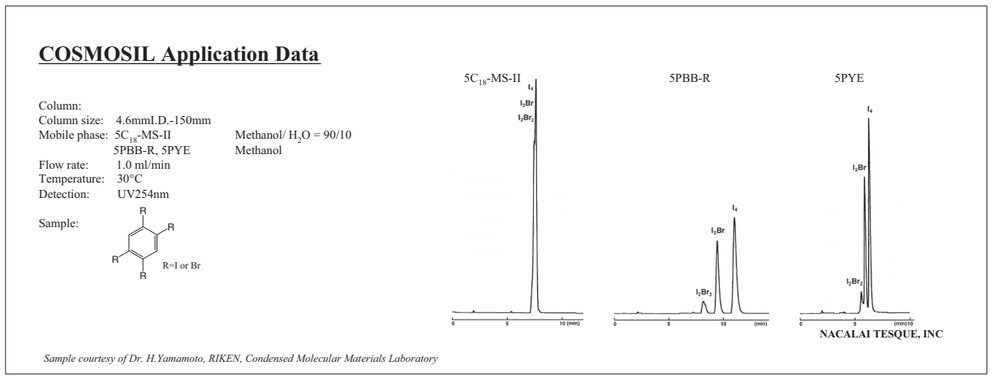




Application data

● Separation of halogen exchange reaction products

PYE and PBB-R retain dispersed iodine atom longer than bromine atom. As a result, PYE and PBB-R can separate the complicated bromine and iodine compounds that C_{18} cannot separate.

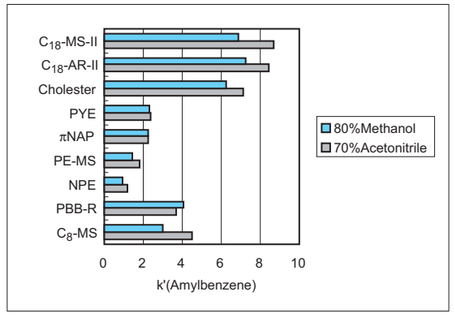


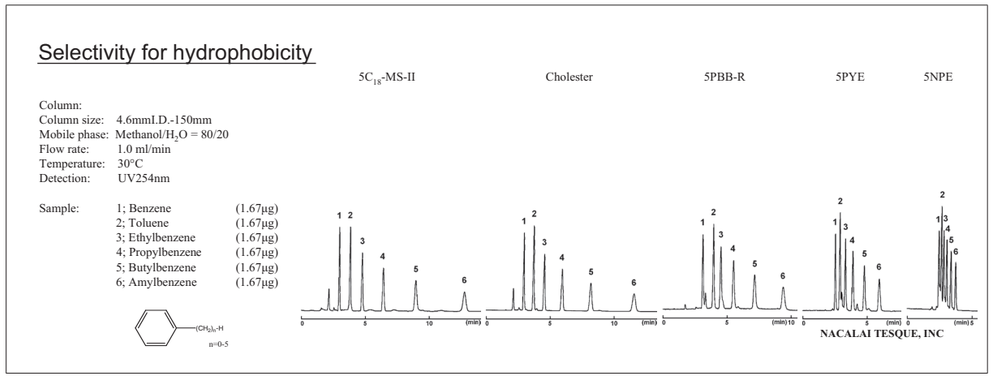
Sample courtesy of Dr. H.Yamamoto, RIKEN, Condensed Molecular Materials Laboratory

6) Selectivity for hydrophobicity

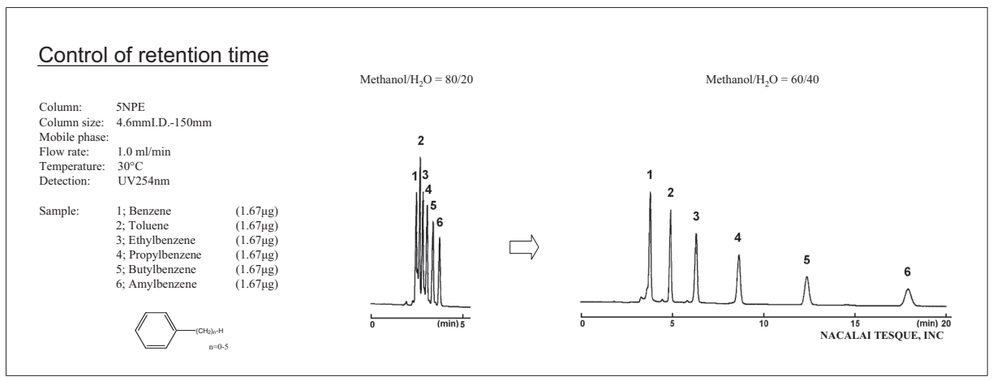
Selectivity

Selectivity for hydrophobicity is evaluated based on the separation of alkylbenzenes. Two C_{18} and Cholester show similar high selectivity for hydrophobicity. Other columns show less hydrophobic selectivity than C_{18}.





Lower concentration of organic solvent in mobile phase leads to much retention in reversed phase chromatography. In case of NPE, when methanol concentration is reduced to 60%, the retention times increase to those similar to C_{18} with 80% methanol.



2. Preparation of mobile phase for HPLC

1) Organic solvent / aqueous mixed mobile phase

1)-1. Preparation of methanol : water = 70 : 30 (v/v) 1L

① Measure 700 ml of methanol in a measuring cylinder.

② Measure 300 ml of distilled water in a measuring cylinder.

③ Mix ① and ② thoroughly and degas.

The better approach is to prepare the mobile phase gravimetrically rather than volumetrically. Following is example of preparation.

Composition table for mobile phase 1L using methanol and water

Methanol / Water	Methanol (g)	Distilled water (g)
90/10 (v/v)	711.9	99.8
80/20 (v/v)	632.8	199.6
70/30 (v/v)	553.7	299.5
60/40 (v/v)	474.6	399.3
50/50 (v/v)	395.5	499.1
40/60 (v/v)	316.4	598.9
30/70 (v/v)	237.3	698.7
20/80 (v/v)	158.2	798.6
10/90 (v/v)	79.1	898.4

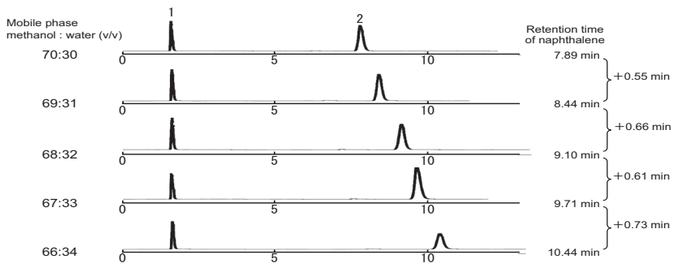
Composition table for mobile phase 1L using acetonitrile and water

Acetonitrile / Water	Acetonitrile (g)	Distilled water (g)
90/10 (v/v)	707.4	99.8
80/20 (v/v)	628.8	199.6
70/30 (v/v)	550.2	299.5
60/40 (v/v)	471.6	399.3
50/50 (v/v)	393.0	499.1
40/60 (v/v)	314.4	598.9
30/70 (v/v)	235.8	698.7
20/80 (v/v)	157.2	798.6
10/90 (v/v)	78.6	898.4

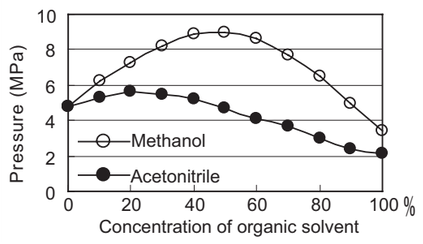
Caution : Methanol and acetonitrile are hazardous substances, do not use for medical purpose. Always process in a laboratory hood and wear an eye protection and a mask.

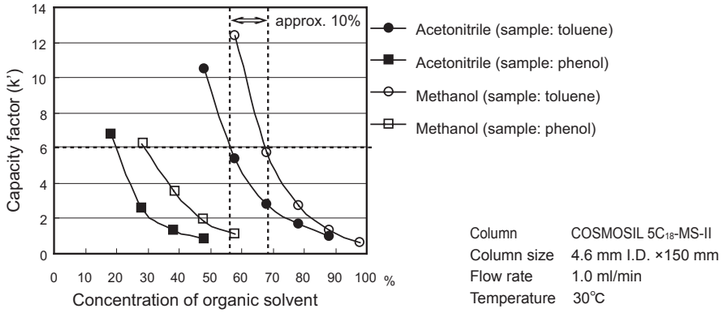
Influence of organic solvent composition in mobile phase on the retention time.

1% difference in the composition significantly changes the retention.



Differences between acetonitrile and methanol in reversed phase liquid chromatography

	Acetonitrile (for HPLC)	Methanol (for HPLC)
Pressure		Column COSMOSIL 5C18-MS-II Column size 4.6 mm I.D. ×150 mm Flow rate 1.0 ml/min Temperature 30℃ Back pressure differs depending on species of organic solvents and mixing ratio. Back pressure of acetonitrile is lower than that of methanol at the same concentration.

	Acetonitrile (for HPLC)	Methanol (for HPLC)
Elution strength	 Column COSMOSIL $5C_{18}$-MS-II Column size 4.6 mm I.D. ×150 mm Flow rate 1.0 ml/min Temperature 30℃ Elution strength of acetonitrile/water is stronger than methanol/ water at the same concentration. Within the range of about 30%-80% in the concentration of the organic solvent, elution strength of acetonitrile/water is almost equivalent to that of methanol/water which was raised methanol concentration about 10% (ex : acetonitrile/water = 60/40 → methanol/water = 70/30)	
Absorbance	Acetonitrile has a lower UV absorbance in far UV region (less than 250 nm) .	Methanol has a higher UV absorbance than acetonitrile in far UV region (less than 250 nm).
Degas of mobile phase	When acetonitrile is mixed with water, it is endothermic. It is difficult to degas.	When methanol is mixed with water, it is exothermic. It is easy to degas.

2) Organic solvent/ aqueous mixed mobile phase

2)-1. Preparation of methanol : 20 mmol/l phosphate buffer (pH2.5) = 80 : 20 (v/v) 1L

・Preparation of 20 mmol/l phosphate buffer (pH2.5)

① Prepare 20 mmol/l sodium dihydrogenphosphate aqueous solution.

② Prepare 20 mmol/l phosphoric acid aqueous solution.

③ Adjust the pH to 2.5 by mixing ① with ② .

④ Filter ③ under reduced pressure to remove insoluble substance that may deteriorate pump-seal and clog columns (0.45 µm or smaller pore size is recommended).

(Easy method)

① Dissolve 1.31 g of sodium dihydrogenphosphate and 1.05 g of phosphoric acid in distilled water to make 1 L solution.

② Filter the solution under reduced pressure to remove insoluble substance (0.45 µm or smaller pore size is recommended).

③ Confirm that the solution is pH2.5.

・Preparation of methanol : 20 mmol/l phosphate buffer (pH2.5) = 80 : 20 1L

① Measure 800 ml of methanol in a measuring cylinder.

② Measure 200 ml of 20 mmol/l phosphate buffer (pH2.5) in a measuring cylinder.

③ Mix ① and ② thoroughly and degas.

2)-2. Preparation of methanol : 20 mmol/l phosphate buffer (pH7.0) = 80 : 20 (v/v) 1L

・Preparation of 20 mmol/l phosphate buffer (pH7.0)

① Prepare 20 mmol/l sodium dihydrogenphosphate aqueous solution.

② Prepare 20 mmol/l di-sodium hydrogenphosphate aqueous solution.

③ Adjust the pH7.0 by mixing ① with ② .

④ Filter ③ under reduced pressure to remove insoluble substance that may deteriorate pump-seal and clog columns (0.45 µm or smaller pore size is recommended).

(Easy method)

① Dissolve 1.14 g of sodium dihydrogenphosphate and 1.49 g of di-sodium hydrogenphosphate in distilled water to make 1L solution.

② Filter the solution under reduced pressure to remove insoluble substance (0.45 µm or smaller pore size is recommended).

③ Confirm that the solution is pH7.0.

・Preparation of Methanol : 20 mmol/l phosphate buffer (pH7.0) = 80 : 20 1 L

① Measure 800 ml of methanol in a measuring cylinder.

② Measure 200 ml of 20 mmol/l phosphate buffer (pH7.0) in a measuring cylinder.

③ Mix ① and ② thoroughly and degas.

The better approach is to prepare the mobile phase gravimetrically rather than volumetrically. Following is example of preparation.

Methanol : 20 mmol/l Phosphate buffer	Methanol (g)	20 mmol/l Phosphate buffer (pH2.5) (g)	20 mmol/l Phosphate buffer (pH7.0) (g)
90 / 10 (v/v)	711.9	99.8	99.9
80 / 20 (v/v)	632.8	199.6	199.8
70 / 30 (v/v)	553.7	299.4	299.7
60 / 40 (v/v)	474.6	399.2	399.6
50 / 50 (v/v)	395.5	499.0	499.5
40 / 60 (v/v)	316.4	598.8	599.4
30 / 70 (v/v)	237.3	698.6	699.3
20 / 80 (v/v)	158.2	798.4	799.2
10 / 90 (v/v)	79.1	898.2	899.1

Caution : Methanol and acetonitrile are hazardous substances, do not use for medical purpose. Always process in a laboratory hood and wear an eye protection and a mask.

3) Preparation of ion pair reagent containing mobile phase

3)-1.Preparation of 5 mmol/l sodium 1-butanesulfonate containing 20 mmol/l phosphate buffer (pH2.5)

① Prepare 5 mmol/l sodium 1-butanesulfonate containing 20 mmol/l sodium dihydrogenphosphate aqueous solution.

② Prepare 5 mmol/l sodium 1-butanesulfonate containing 20 mmol/l phosphoric acid aqueous solution

③ Adjust the pH to 2.5 by mixing ① with ② .

④ Filter ③ under reduced pressure to remove insoluble substance that may deteriorate pump-seal and clog columns (0.45 µm or smaller pore size is recommended).

(Easy method)

① Dissolve 1.31 g of sodium dihydrogenphosphate, 1.05 g of phosphoric acid and 0.80 g of sodium 1-butanesulfonate in distilled water to make 1L solution.

② Filter the solution under reduced pressure to remove insoluble substance (0.45 µm or smaller pore size is recommended).

③ Confirm that the solution is pH2.5.

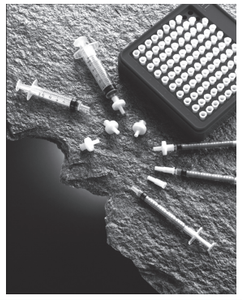
※ 0.5 M Sodium 1-butanesulfonate aqueous solution is also available from Nacalai Tesque.

3. Sample pretreatment for HPLC

Pretreatment before HPLC analysis is often required for samples of low concentration or samples containing analytical contaminants. It improves reproducibility and sensitivity in analysis, and protects HPLC columns. The preparation methods are different according to the each sample. The followings are examples of different pretreatments.

1) Filtration

Filtration is a common method used for separating solids from liquids. It extends a column's life by minimizing column damages from solid contaminants such as particles, sediments and colloid substances. It also improves reproducibility of analytical data. We offer both syringe-type and spin-type filters for sample filtration.

	■ Syringe filter	■ Centrifugal filter
Product	Cosmonice filter	Cosmospin filter
Configuration		
Usage	Easy to use. Just attach a filter on top of a syringe.	Easy to use by centrifugation.
Type	・W (aqueous system) ・S (solvent system)	・Pore diameter : 0.2 µm ・Pore diamater : 0.45 µm
Required equipment	Syringe・Sample bottle	Centrifuge
Page	refer to page 74	refer to page 74

Cosmonice filter

How to use :

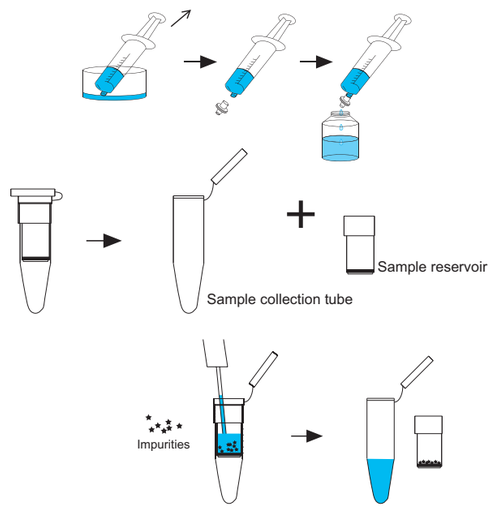
① Fill a syringe with the sample you want to filter.
② Attach a Cosmonice filter to the syringe.
③ Push the syringe plunger to filter the sample.
④ Analyze the filtered sample by HPLC.

Cosmospin filter

Components : ・Sample reservoir
・Sample collection tube

How to use :

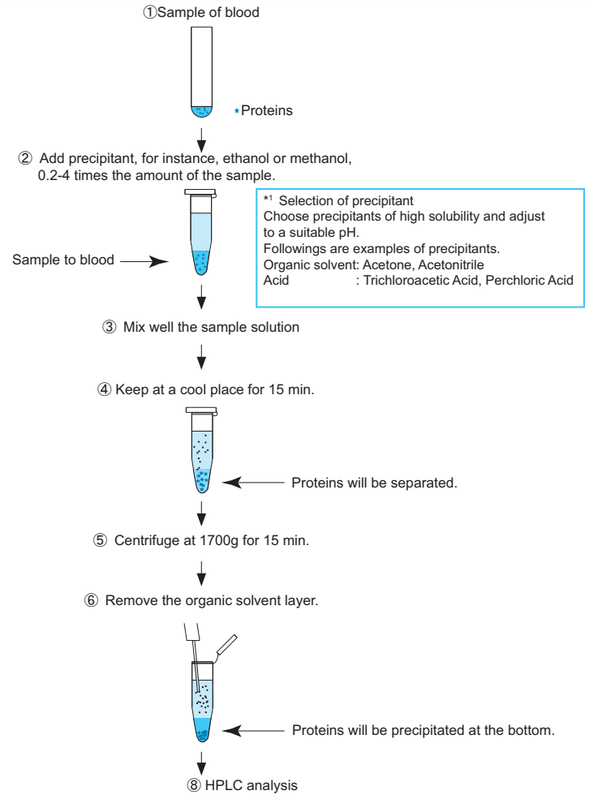
① Insert a Cosmospin sample reservoir into a Cosmospin sample collection tube.
② Add a sample into the Cosmopsin sample reservoir.
③ Close the sample collection tube cap and centrifuge.
④ Remove the sample reservoir and collect the filtered sample in the sample collection tube.
⑤ Analyze the filtered sample by HPLC.



2) Protein precipitation

Protein precipitation is commonly used to remove proteins in samples for downstream analysis. For example, when analyzing drug concentration in blood samples, proteins have to be removed first. Otherwise, proteins may be adsorbed in columns and interfere with the analysis. Common methods for protein recipitation include salting out, isoelectric point precipitation and precipitation with organic solvents. The following shows a general procedure for protein precipitation with organic solvents.

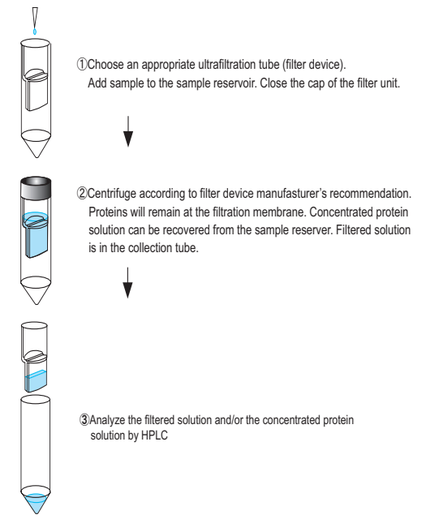
Procedure for protein precipitation :



3) Ultrafiltration

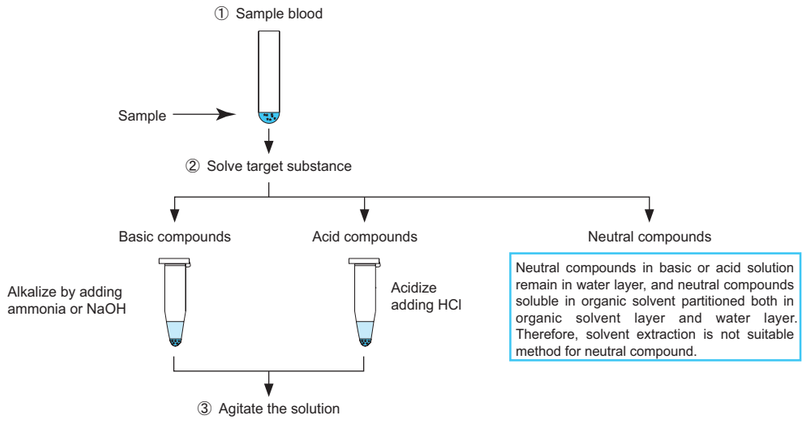
Ultrafiltration is a method to concentrate proteins or other macromolecules through a semipermeable membrane with defined pores. Ultrafiltration is applicable for sample desalting, concentrating proteins from dilute solution such as urine samples, or deproteinizing samples with high protein concentration (i.e. blood serum or plasma). Following is a general procedure for ultrafiltration.

Procedure for ultrafiltration :



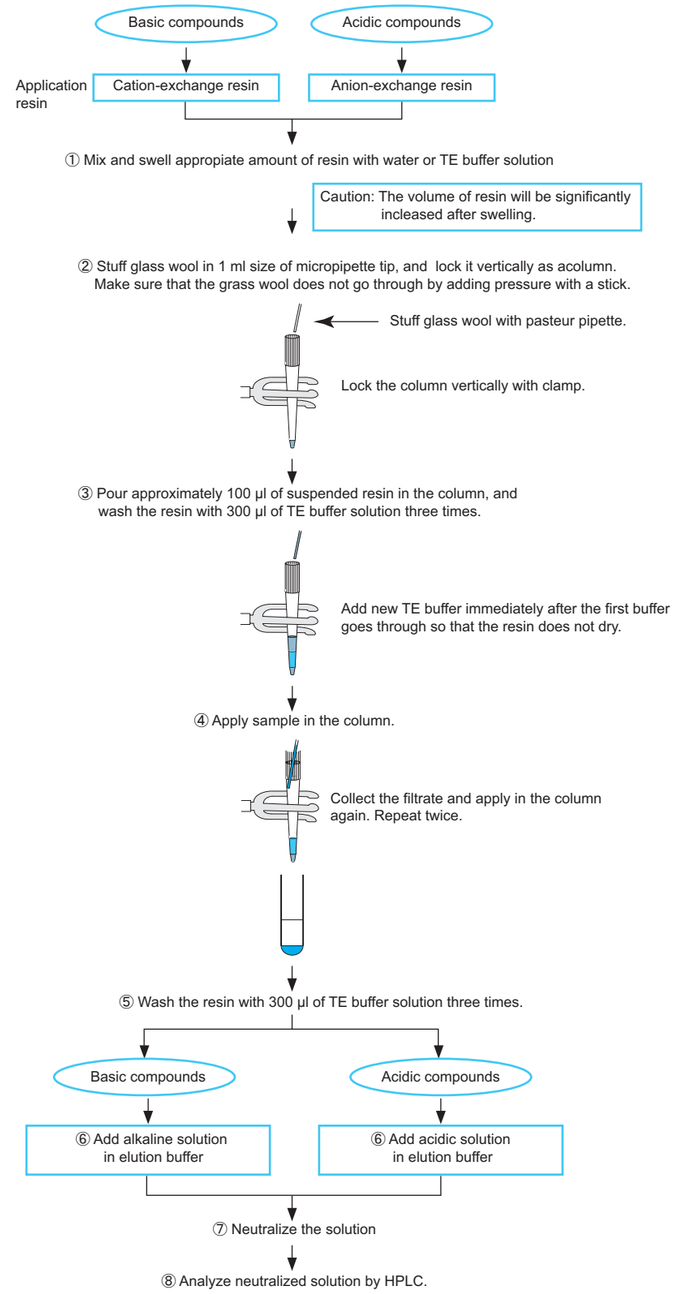
4) Solvent extraction method

Solvent extraction is a method to separate compounds due to their unequal solubility in two immiscible liquid phases, usually water and an organic solvent. The method is used to concentrate highly hydrophobic compounds, and consequently increase analytical sensitivity. A buffer solution is added to sample to optimize the pH and target substance is then extracted by an organic solvent such as ether and chloroform. However, when target substance is combined with proteins, solvent extraction may not work well.



5) Ion exchange

Pretreatment by ion-exchange resin may be effective for samples that the solvent extraction method cannot be adapted due to its emulsification. A preliminary experiment may be required for the selection of resin and experimental conditions. For example, a negatively charged compound is strongly adsorbed on an anion-exchange resin such as DEAE cellulose resin. Therefore, the target compound is collected by increasing salt concentration of buffer solution or adjusting pH of elution buffer after washing off other weakly adsorbed undesired substances.



4. Baseline noise in gradient elution

In gradient analysis, incomplete mixing of mobile phases or impurities in water of mobile phase can cause baseline noise. In the former case, it can be improved by using a proper mixer before injector (Baseline 1→2). In the latter case, it can be improved by using a pre-column. Impurities in water are adsorbed on the pre-column (Baseline 2→3). COSMOSIL 5C_{18}-AR-II 4.6 mm I.D. x 10 mm or 10 mm I.D. x 20 mm as a pre-column.

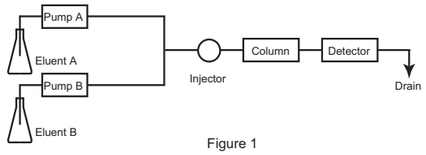
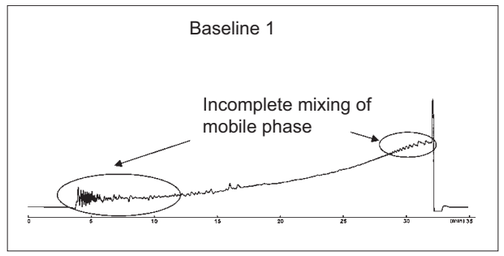


Figure 1



＋ Mixer

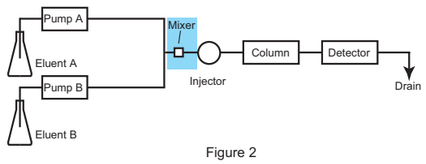
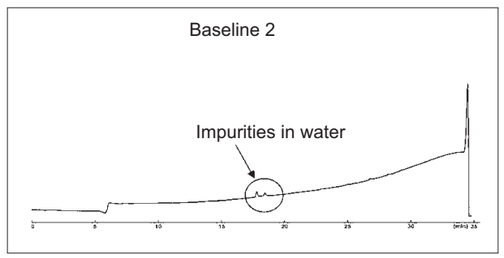


Figure 2



＋ Pre-column

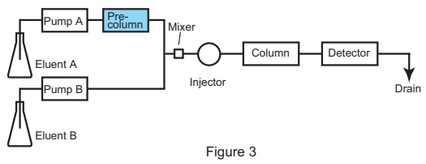
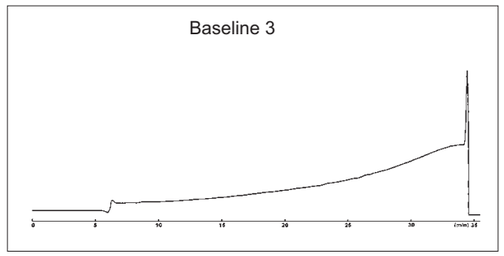


Figure 3



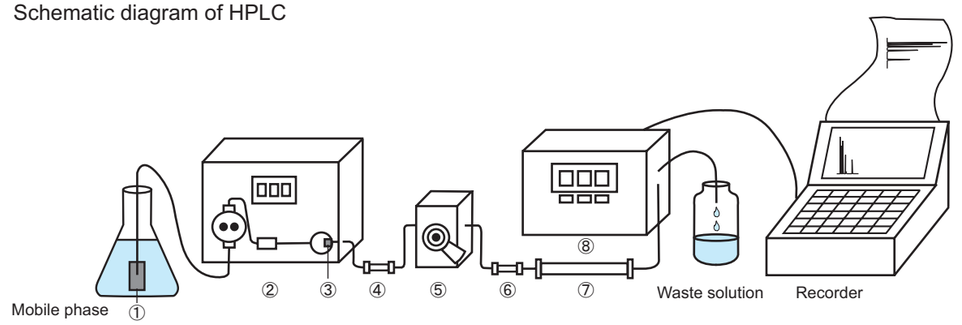
Column	COSMOSIL 5C_{18}-AR-300 4.6 mm I.D. x 150mm
Precolumn	COSMOSIL 5C_{18}-AR-II 4.6 mm I.D. x 10mm
Mobile phase	A: 0.1% TFA containing water B: 0.1% TFA containing 95% acetonitrile B: 0% → 100%/30 min liner gradient
Flow rate	1.0 ml/min
Temperature	30℃
Detection	UV 220nm

5. Troubleshooting for increased pressure

Repeated analysis may increase back pressure. Continuous use of HPLC columns under high pressure can cause deterioration and overload of the equipment. Therefore, it is important to monitor column back pressure regularly and solve the problem timely.

The back pressure increase can be due to clogging of a column or clogging of the equipment. First of all, identify the clogging site.

Schematic diagram of HPLC



①Suction filter → ②Pump → ③Line filter → ④Precolumn → ⑤Injector → ⑥Guard column → ⑦Analytical column → ⑧Detector

Remove analytical column first and connect the plumbing from the back of HPLC system directly to the detector. Measure the pressure of flowing mobile phase without an HPLC column. Generally equipment should hardly generate any pressure. If there is significant flow pressure, disconnect the system components one by one to identify the clogged component(s). Possible causes and solutions of clogged equipment are discussed in section II below.

If the flow pressure without a column is normal, then pressure increase is due to clogging of a column. In this case, one needs to determine the causes and whether it is time to replace the column. Possible causes and solutions of clogged column are discussed in greater details in sections I and III.

Symptom				Possible Cause
Pressure increase rapidly in short-term use	→ Yes	Flow pressure without a column is 0-0.3 MPa	→	Clogging of column Refer to section Ⅰ
		Flow pressure with a column is 0-0.3 MPa or higher	→	Clogging of equipment Refer to section Ⅱ
Pressure increase gradually in long-term use	→ Yes	Deterioration of column due to long-term use refer to section Ⅲ		

Ⅰ. Solution in case an HPLC column is clogged in short-term use.

Select the possible cause of clogging according to the following flow chart.

STEP 1	・Salt deposition ・Use mobile phase of high concentration organic solvent right after using buffer	→ YES	Cause 1
↓ NO			
STEP 2	・Forget to filter mobile phase ・Sample is not dissolved enough	→ YES	Cause 2
↓ NO			
STEP 3	・Analyzing samples which tend to absorb to a column (i.e. protein samples) ・Sample deposition in column	→ YES	Cause 3

Cause 1 Salt is deposited on a column.
Solution : Wash columns for 30 minutes at half of the analytical flow rate with 10% organic solvent (methanol or aceto nitrile) in water to dissolve deposited salt. If the situation is not improved, wash with 100% water under the same condition.
Prevention : To switch to high concentration organic solvent after using a buffer, first wash a column with a mobile phase not containing salt (with the same concentration of organic solvent as the buffer), then switch to the mobile phase of higher organic solvent concentration. Example : To change mobile phase from 10/90 (v/v) acetonitrile/20mmol/l phosphate buffer (pH2.5) to 90/10 (v/v) acetonitrile/water, first wash for 15 minutes with 10/90 (v/v) acetonitrile/water, and then switch to 90/10 (v/v) acetonitrile/water.

Cause 2 Column filter is clogged by sample or impurities.
Solution : Connect the column in reverse direction, and then wash the column for 30 minutes at half of the usual analytical flow rate with the mobile phase used for analysis. If the situation is not improved, change the end fitting in the front of column. (We can replace end fittings with a paid service fee.)
Prevention : We recommend filtering sample and/or mobile phase. For more information, please refer to page 164, TECHNICAL NOTE 3. Sample pretreatment for HPLC 1) filtration.

Cause 3 Sample may be adsorbed to packing material or deposited in a column.
Solution : Wash for 30 minutes at half of analytical flow rates with a solvent which adsorbed substances are dissolved in. The followings are how to wash each type of columns.
[Reversed phase columns]
a) When an absorbed substance is not protein, wash with methanol or tetrahydrofuran.
b) When an absorbed substance is protein, wash with 50-70% of acetonitrile/water (containing 0.1% of trifluoroacetic acid). However proteins may be deposited in high concentration of organic solvent depending on varieties.
[COSMOSIL Sugar-D/NH_2/HILIC columns]
Wash with 50/50 (v/v) acetonitrile/water for NH_2-MS and 100% water for Sugar-D and HILIC columns.
[COSMOSIL SL-II]
Wash with methanol, tetrahydrofuran or ethanol.
Prevention : Choose appropriate pretreatment for each sample. For more information, please refer to page 164, TECHNICAL NOTE 3. Sample pretreatment for HPLC 1) filtration. We also recommend using guard column. For more information for guard columns, please refer to page 172, TECHNICAL NOTE 6. Effect of guard columns.
Caution :
- When wash columns, do not connect column exit and let the solution through.
- Long term of washing may deteriorate the performance of columns.
- Do not use strongly alkaline solution (more than pH 7.5) or strongly acidic solution (less than pH 1.5) for silica gel base packing material.
- Store columns with manufacturer recommended storage solvent after washing,

When the situation is not improved, replace the column.

II. Solutions in case pressure is too high because of clogged equipment.

First, identify the specific clogging site by disconnecting the components in the system one by one and checking the flow pressure. The followings are possible common causes.

Cause 1 Salt is deposited in plumbing.
Solution : Flow water to the plumbing without connecting a column and any other equipment. Washing out the plumbing in a reversing connection is also an effective way. If the situation is not improved, replace it with a new one.

Cause 2 Check-valve of pump is clogged by stain
Solution : Wash the check-valve with a stain dissolving solvent. Take apart the washable part, soak it in the solvent, then clean in an ultrasonic cleaner.

Cause 3 Manual injector is clogged with stain
Solution : Wash with a stain dissolving solvent. Soak rotor seal and line filter in water and clean them in an ultrasonic cleaner. If the situation is not improved, replace the injector.
Prevention : It extends the life time of an HPLC system to maintain regular wash of the system. Wash the system the same as wash an HPLC column. When the mobile phase contains salt, wash for 10-15 minutes with a mobile phase which has the same composition but not containing salt. For example, when using 50/50 (v/v) methanol/20mmol/l phosphate buffer, wash with 50/50 (v/v) methanol/water. When the mobile phase contains halogen, acid and/or base, wash for 10-15 minutes with mobile phase which has the same composition but not containing halogen, acid and/ or base.

III. Solutions in case a column is damaged from long term use

Every column will have to be replaced eventually. Performance of a column is expected to deteriorate slowly after long term use. One has to decide whether it is time to replace the column.

Cause 1 Column deterioration result from long term use.
Solution : Wash according to Section I, Cause 3.
Prevention : Same as prevention in Section I, Cause 3. When the column condition is not improved, you could continue to use the column if peak shapes do not change and the maximum pressure is less than 20 MPa. However, we recommend replacing the column because it place extra burden on the equipment.

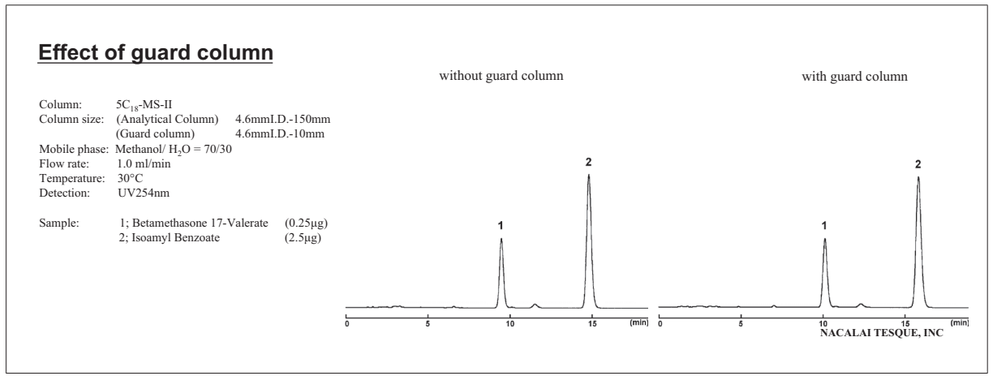
Cause 2 Silica gel in the column may be cracked because of long term use.
Solution : Replace the columns.

6. Effect of guard column

The use of guard columns to protect both analytical and preparative columns is highly recommended.
COSMOSIL guard columns are packed with packing materials identical to that used in analytical and preparative columns. As a result, the COSMOSIL guard columns do not contribute to any decrease in the performance of the main column.

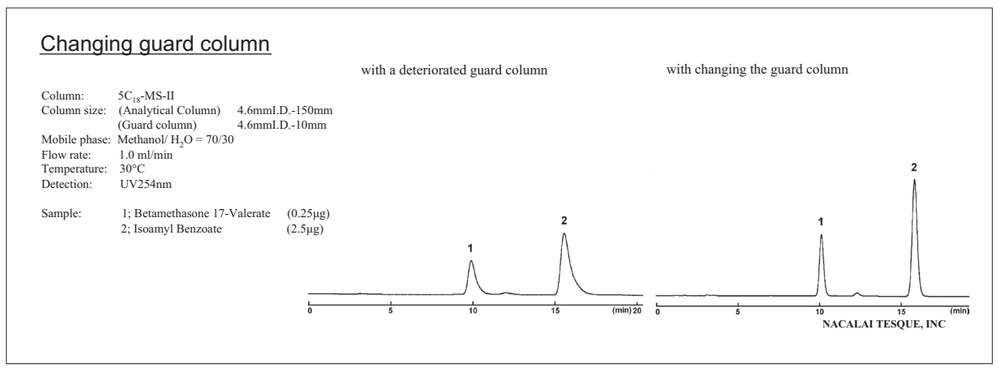
Example of using guard columns

The following chromatograms show analysis examples using a COSMOSIL 5C_{18}-MS-II analytical column (4.6 mm I.D. × 150 mm) and the same column connected with its guard column (4.6 mm I.D. × 10 mm). There is no change in separation characteristics since the packing material of the guard column is identical to that used in the main column.



Inspection of columns

We recommend that the performance of a column be examined regularly. Deteriorated columns shall be replaced timely.
If a deteriorated guard column continues to be used, the packed column will also deteriorate.



Ordering information

Please refer to respective pages of each column.
Please refer to page 76 for the parts necessary to use guard columns or guard column cartridges.

7. Troubleshooting for normal phase chromatography

Q 1 : How can I convert from reversed phase mode to normal phase mode or vice versus using the same HPLC equipment?

A 1 : To convert from reversed phase mode to normal phase mode, or vice versus, flush the equipment with a solvent that is miscible with both the current mobile phase and the intended mobile phase. Connect the HPLC pump directly with the detector, and replace the solvents according to following instructions.

Solvent conversion from reversed phase to normal phase

① To convert a mobile phase without buffer solution in reversed phase to normal phase, replace solvents according to the following steps :
1) Flush the equipment with a solvent for reversed phase. For example, methanol/H_2O (v/v=50/50).
2) Flush the equipment with a solvent miscible to both mobile phases. For example, tetrahydrofuran, ethanol.
3) Flush the equipment with a solvent for normal phase.

② To convert a mobile phase with buffer solution in reversed phase to normal phase, replace solvents according to the following steps :
1) Flush the equipment with a solvent with buffer solution for reversed phase.
2) Flush the equipment with a solvent with the composition same as 1) and without salt.
3) Flush the equipment with a solvent miscible to both mobile phases. For example, tetrahydrofuran, ethanol.
4) Flush the equipment with a solvent for normal phase.

Solvent conversion from normal phase to reversed phase

① To convert from normal phase to a mobile phase without buffer solution in reversed phase, replace solvents according to following steps :
1) Flush the equipment with a solvent for normal phase.
2) Flush the equipment with a solvent miscible to both mobile phases. For example tetrahydrofuran, ethanol.
3) Flush the equipment with a solvent for reversed phase.

② To convert from normal phase to a mobile phase with buffer solution in reversed phase, replace solvents according to following steps :
1) Flush the equipment with a solvent for normal phase. For example, hexane/ethyl acetate.
2) Flush the equipment with a solvent miscible to both mobile phases. For example tetrahydrofuran, ethanol.
3) Flush the equipment with a solvent with the composition same as 4) and without salt.
4) Flush the equipment with a solvent for reversed phase.

Q 2 : My flow rate is not stable. How can I troubleshoot?

A 2 : Possible causes for unstable flow rate can be a malfunctioning check valve or air in a mobile phase, wash the check valve thoroughly by ultrasonic cleaner. Solvents with a low boiling point such as n-Hexan and n-Heptane generate air easily. To prevent air generation, degas the mobile phase sufficiently.

Q 3 : In spite of using the same condition, the retention time is different. How can I solve the problem?

A 3 : One possible cause is unstable flow rate. Please refer to Q2 section.
Another possible cause is variation of polar component in mobile phases. In normal phase chromatography, the retention time depends on the concentration of small amounts of very polar constituents in the mobile phase. This is especially true for water content in a mobile phase. In this case, always use fresh solvents in a mobile phase. If sample solvent includes water, change to a solvent without water or decrease injection volume. If a column contains water, remove water from the column by washing it with ethanol.

Q 4 : How can I wash the COSMOSIL SL-II column?

A 4 : The SL-II column can be washed with tetrahydrofuran, methanol, ethanol, methylene chloride, n-Hexane or n-Heptane.

Q 5 : How can I store the COSMOSIL SL-II column?

A 5 : Store the SL- II column with the shipping screw tighten in order to prevent the solvent in the column from volatilization. In case where a solvent containing halogens is used, replace the solvent in the column with a solvent without halogens such as n-Heptane before storing.

Q 6 : I get peak tailing in my run. What can I do about it?

A 6 : ① In case where the sample contains acidic compounds, add approx. 0.5% of acetic acid to the mobilephase.
② In case where the sample contains basic compounds, add approx. 0.5% of triethylamine to the mobile phase.

Q 7 : I get no peaks. How can I troubleshoot?

A 7 : First, make sure that there is no problem with the system. If the problems are with the sample, sample solvent or mobile phase, try following check list.

1. The analyte may not be eluted from a column because the retention of the analyte is too strong. In this case, use a stronger eluent (mobile phase).
2. The sample contains chelating compounds or basic compounds. They may be adsorbed to the packing materials. In this case, add 0.1% - 1% acid (trifluoroacetic acid or acetic acid) to the mobile phase.

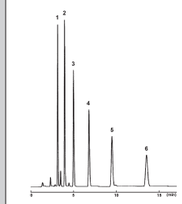
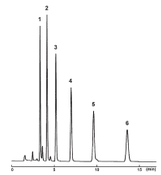
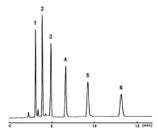
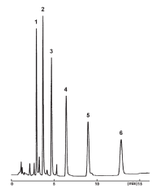
8. Inner diameter of column (scale down and scale up)

The figure below shows general parameters for 1.0 mm to 50 mm I.D. COSMOSIL columns : flow rate, equipment, inner diameter of pipe, application, surface ratio (compared with 4.6 mm I.D.) and particle size. It may help to scale up or down from the most commonly used 4.6 mm I.D. column.

Inner diameter (mm I.D.)	1.0	2.0	3.0	4.6	10	20	28	50
Flow rate (ml/min)	0.05	0.2	0.4	1.0	5.0	19	37	70
Detector cell・Injector	for Semi-micro		for Analytical			for Preparative		
Inner diameter of pipe (mm)	0.05	0.1	0.2-0.3			1.0		
Application	LC-MS Solvent saving		Solvent saving with standard system	Standard	Preparative (small scale)	Preparative (medium scale)	Preparative (large scale)	Preparative (super large scale)
Surface ratio with 4.6 mm I.D.	0.05	0.19	0.43	1.00	4.73	18.90	37.05	118.15
Particle size (μm)	3 or 5				5		15 or more	

Scale down

When scaling down from the most commonly used analytical column (4.6 mm I.D.) to a semi-micro or 3.0 mm I.D. analytical HPLC column (of the same column length), sample loading dose is proportionate to the cross section of column. The 3.0 mm I.D. columns provide high sensitivity and solvent saving without the need to change the existing equipment settings. Semi-micro columns (2.0 mm I.D. and 1.0 mm I.D.) provide higher sensitivity and enable analysis of minor components, but one needs to change the piping of HPLC equipment, the injector and the detector cell for semimicro columns.

Column size	4.6 mm I.D. × 150 mm	3.0 mm I.D. × 150 mm	2.0 mm I.D. × 150 mm	1.0 mm I.D. × 150 mm
Chromatogram				
Flow rate (ml/min)	1.0	0.4	0.2	0.05
Pressure (MPa)	3.4	3.6	3.8	3.6
Injection volume(μl)	1.0	0.4	0.2	0.05
Detector Cell・Injector	for Analytical		for Semi-micro	
Detector sensitivity(AUFS)	0.08		0.04	
Inner diameter of pipe (mm)	0.25		0.10	0.05

Column: COSMOSIL 5C_{18}-MS- II
Mobile phase: Acetonitrile : Water = 70 : 30
Flow rate: 1.0 ml/min
Temperature: 30℃
Detection: UV 254 nm

Sample
1. Benzene
2. Toluene
3. Ethylbenzene
4. Propylbenzene
5. Butylbenzene
6. Amylbenzene

V INDEX

Sample name

A

B

C

D

E

F

G

O

P

Q

R

S

T

U

V

X

Z

Packing material's name

C_{18}-MS-II

C_{18}-AR-II

C_{18}-PAQ

Cholester

πNAP

PYE

NPE

PBB-R

CN-MS

C_{22}-AR-II

C_8-MS

C_4-MS

TMS-MS

PE-MS

SL-II

HILIC

Sugar-D

NH_2-MS

Protein-R

C_{18}-AR-300

C_8-AR-300

C_4-AR-300

Ph-AR-300

Diol-120-II

Diol-300-II

DEAE

QA

CM

SP

HIC

Buckyprep

Buckyprep-M

PBB

PBB-R

CNT-300

CNT-1000

CNT-2000

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